Thermo Scientific
Laboratory Temperature Control Products

Manual Part Number U01047
Rev. 05/29/2015

Premium Series Heated Immersion Circulators

PC200

PC201

PC300

ARCTIC Series Refrigerated/Heated Bath Circulators

A10B **A28F**

A24B **A25**

A28 **A40**

GLACIER Refrigerated Bath Circulator

G50

SAHARA Series Heated Bath Circulators

S7 **S30**

S13 **S45**

S15 **S49**

CE

Multilingual Quick Start Guides

Installation

Operation

Basic Maintenance

Visit our Web site at:

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Declaration of Conformity

RoHS Directive

Warranty

⚠ This quick start guide is intended for initial start up only. For all other procedures you must refer to the manual. Also, if any of these steps are not clear download the manual before proceeding.

Safety:

- The bath is designed for indoor use only. Never place the bath in a location where excessive heat, moisture, inadequate ventilation, or corrosive materials are present.
- Connect the bath to a properly grounded outlet.
- Never operate the equipment with a damaged line cord.
- The refrigerants are heavier than air and will replace the oxygen causing loss of consciousness. Contact with leaking refrigerant will cause skin burns. Refer to the bath's nameplate and the manufacturer's most current MSDS for handling precautions and disposal.
- Move the bath with care, sudden jolts or drops can damage its components. Always turn the equipment off and disconnect it from its supply voltage before moving it.
- Never operate damaged or leaking equipment.
- Never operate the equipment without fluid in the bath's reservoir.
- Ensure none of the tubing comes in contact with the power cord.
- Extreme operating temperatures will lead to extreme temperatures on the tube surface, this is even more critical with metal nozzles.
- Ensure the tubing you select meets your maximum temperature and pressure requirements.
- Do not subject tubing to mechanical strain and ensure any specified bend radius is not exceeded.
- Always turn off the circulator and disconnect the power cord from the power source before installing the optional platform or bridge.
- Use only the approved fluids shown in Table 1. Before using any fluid where contact with the fluid is likely, refer to the manufacturer's MSDS for handling precautions and disposal. Also, refer to the MSDS for venting requirements.

Table 1. Approved Fluids:

Filtered/single distilled water (pH 7-8)
Deionized water (1-3 MΩ-cm, compensated)
Distilled water with Nalco biocide and inhibitor
Distilled water with chlorine (5 ppm)
0 to 75% Laboratory Grade Glycol/Water

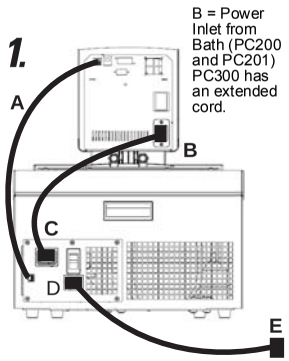
SIL 100	SYNTH 60
SIL 180	SYNTH 260
SIL 300	

- When using water above 80 °C monitor the fluid level, frequent top-offs will be required. It also creates steam.
- Water/glycol mixtures require top-offs with pure water, otherwise the percentage of glycol will increase resulting in high viscosity and poor performance.

What you need to get started:

- An adjustable wrench
- Appropriate hose or plumbing
- Appropriate size hose clamps

1.



B = Power Inlet from Bath (PC200 and PC201) PC300 has an extended cord.

The circuit protection is designed to protect the circulator. The circulator's line cord is designed to act as a disconnecting device, position the circulator so it is not difficult to access the cord.

Refer to the bath nameplate on the rear of the bath for specific electrical requirements. Voltage deviations of ± 10% are permissible. The outlet must be rated as suitable for total power consumption.

- Ensure the cords do not come in contact with any of the plumbing connections or tubing.

1A. For refrigerated baths make all supplied communication and electrical connections prior to starting.

- Never connect controller power inlet, B, to a power outlet. Never connect power outlet, C, to anything but the circulator.

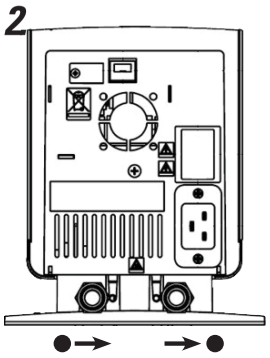
Install the supplied communications cable, **A**, between the circulator and the bath RJ45 connectors.

Install the power cord from the connector, **B**, to the connector on the bath, **C**.

Connect the bath's power cord, **D**, to a grounded power outlet, **E**.

1B. For non-refrigerated baths the power supply, **B**, goes directly to a grounded power outlet, **E**.

2.



2. Plumbing connections for external circulation are on the rear of the circulator. → ● is the return flow from the external application. ● → is the outlet flow to the external application. The connections are 16 mm O.D.

If desired, remove the union nuts and plates to install the supplied 8 or 12 mm hose barbs and clamps.

- To prevent damage to the circulator's plumbing, use a 19 mm backing wrench when removing/installing the external connections.

Ensure the drain port on the front of the bath is closed and that all plumbing connections are secure.

To avoid spilling, place any application containers into the bath before filling.

Fill the bath work area from 2.0 cm (3/4") to 4.0 cm (1 1/2") below the top.

- Avoid overfilling, oil-based fluids expand when heated.
- Leave refrigerated baths in an upright position at ~25°C for 24 hours before starting.

Using a flathead screwdriver, ensure the HTC is in the full clockwise position.

Do not start the circulator until fluid is added to the bath reservoir. Have extra fluid on hand.

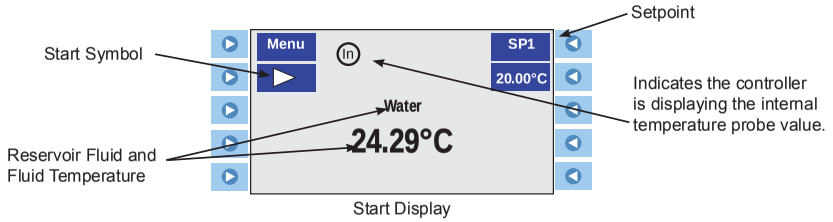
For refrigerated baths, place its circuit protector located on the rear of the bath to the **I** position.

For all circulators, place the circuit protector located on the rear to the **I** position. The blue LED on the front panel illuminates.

3. Press ⏻, the Start Display appears.

Press ▶ to the left of the start symbol, ▶. The circulator will start and the start symbol will turn into a stop symbol, ■. The pump starts immediately but the compressor takes 30 seconds.

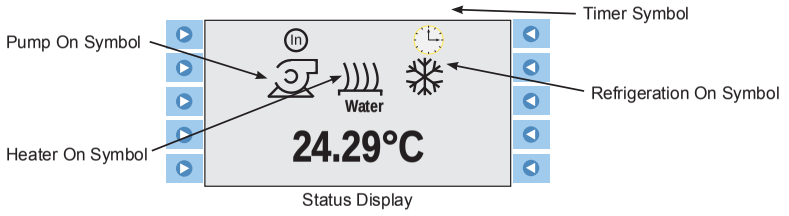
3.



Start Display

4. If desired, press esc to bring up the Status Display. Press esc to toggle between the Start/Status Displays.

4.



Status Display

After starting check all plumbing connections for leaks.

Adjust the High Temperature Cutout (HTC) safety device, refer to the manual.

⚠ Diese Kurzanleitung ist nur für die erste Inbetriebnahme vorgesehen. Für alle anderen Verfahren müssen Sie im Handbuch nachsehen. Auch wenn irgendwelche Schritte unverständlich sind, laden Sie das Handbuch herunter, bevor Sie fortfahren.

Sicherheit:

- Das Bad darf nur in geschlossenen Räumen betrieben werden. Stellen Sie das Bad niemals an Orten auf, an denen es übermäßiger Hitze, Feuchtigkeit, unzureichender Belüftung oder korrosiven Stoffen ausgesetzt ist.
- Schließen Sie das Bad an eine ordnungsgemäß geerdete Steckdose an.
- Betreiben Sie das Gerät niemals mit einem beschädigten Stromkabel.
- Da die verwendeten Kühlmittel schwerer als Luft sind und den Sauerstoff verdrängen, kann es zu Bewusstlosigkeit kommen. Der Kontakt mit auslaufendem Kühlmittel kann Hautverbrennungen verursachen. Informationen zu Vorsichtsmaßnahmen für Umgang und Entsorgung finden Sie auf dem Typenschild des Bads sowie im aktuellen Sicherheitsdatenblatt (SDB) des Herstellers.
- Bewegen Sie das Bad vorsichtig; plötzliche Erschütterungen oder Stürze können die Bauteile beschädigen. Schalten Sie das Gerät immer ab und trennen Sie es von der Versorgungsspannung, bevor Sie es bewegen.
- Betreiben Sie niemals beschädigte oder undichte Ausrüstung.
- Betreiben Sie das Gerät niemals, solange sich keine Flüssigkeit im Behälter des Bads befindet.
- Achten Sie darauf, dass keiner der Schläuche mit dem Stromkabel in Kontakt gerät.
- Extreme Betriebstemperaturen führen zu extremen Temperaturen an der Schlauchoberfläche, insbesondere an Metalldüsen.
- Stellen Sie sicher, dass die von Ihnen ausgewählten Schläuche für die Höchstgrenzen für Temperatur und Druck geeignet sind.
- Die Schläuche dürfen keiner mechanischen Beanspruchung ausgesetzt werden, und der spezifizierte Biegeradius darf nicht überschritten werden.
- Schalten Sie das Gerät ab und trennen Sie das Stromkabel von der Stromquelle, bevor Sie den optionalen Plattform- oder Brückenaufsatz installieren.
- Verwenden Sie nur die in Tabelle 1 gezeigten zugelassenen Flüssigkeiten. Beachten Sie die im Sicherheitsdatenblatt (SDB) des Herstellers beschriebenen Vorsichtsmaßnahmen für Umgang und Entsorgung, bevor Sie Flüssigkeiten einsetzen, bei denen Sie möglicherweise mit der Flüssigkeit in Berührung kommen. Informationen zu Belüftungsanforderungen finden Sie ebenfalls im SDB.

Tabelle 1. Genehmigte Flüssigkeiten:

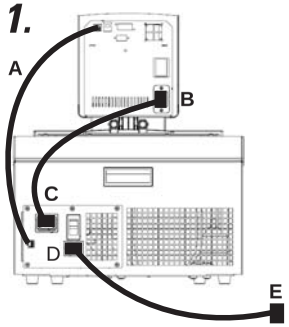
Filtriertes/einfach destilliertes Wasser (pH 7 bis 8)	
Deionisiertes Wasser (1 bis 3 MΩ-cm, kompensiert)	
Destilliertes Wasser mit Nalco Biozid und Inhibitor	
Destilliertes Wasser mit Chlor (5 ppm)	
Glykol/Wasser-Gemische von 0 bis 75 % in Laborqualität	
SIL 100	SYNTH 60
SIL 180	SYNTH 260
SIL 300	

- Wenn Sie Wasser mit einer Temperatur von über 80 °C verwenden, überwachen Sie den Füllstand, da ein häufiges Auffüllen erforderlich sein wird. Außerdem kommt es zur Dampfbildung.
- Wasser/Glykol-Gemische müssen mit reinem Wasser nachgefüllt werden, da ansonsten der Glykolanteil ansteigt, was eine hohe Viskosität und eine schlechte Leistung zur Folge hat.

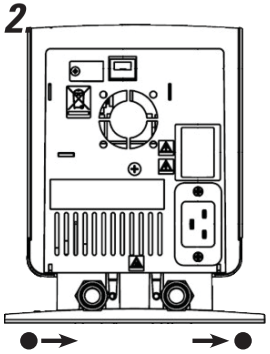
Sie benötigen für die Inbetriebnahme:

- Einen verstellbaren Schraubenschlüssel
- Passende Schläuche bzw. Leitungen
- Schlauchklemmen in geeigneter Größe

1.



2



Der Stromkreisschutz ist für den Schutz des Thermostats ausgelegt. Das Stromkabel des Thermostats ist als Trennvorrichtung vorgesehen; positionieren Sie das Thermostat so, dass das Kabel gut zugänglich ist.

Die spezifischen elektrischen Anforderungen finden Sie auf dem Bad-Typenschild an der Rückseite des Bads. Es sind Spannungsschwankungen von ±10 % zulässig. Die Steckdose muss als geeignet für den Gesamtenergieverbrauch eingestuft sein.

- Achten Sie darauf, dass die Kabel nicht mit einem der Wasseranschlüsse oder den Schläuchen in Kontakt geraten.

1A. Bei Kühlbädern müssen alle vorgesehenen Kommunikations- und Stromverbindungen vor dem Start hergestellt werden.

- Der Stromeingang des Reglers (B) darf niemals an einen Stromausgang angeschlossen werden. Schließen Sie den Stromausgang (C) ausschließlich an den Thermostat an.

Schließen Sie das mitgelieferte Kommunikationskabel (**A**) an den RJ45-Anschlüssen des Thermostats und des Bads an.

Schließen Sie das Stromkabel vom Anschluss (**B**) an den Anschluss des Bads (**C**) an.

Schließen Sie das Stromkabel des Bads (**D**) an eine geerdete Steckdose (**E**) an.

1B. Bei nicht gekühlten Bädern verläuft die Stromversorgung (**B**) direkt zu einer geerdeten Steckdose (**E**).

2. Die Wasseranschlüsse für die externe Umwälzung befinden sich an der Rückseite des Thermostats.

→● ist der Rückfluss von der externen Anwendung. ●→ ist der Zufluss zur externen Anwendung. Der Außendurchmesser der Anschlüsse beträgt 16 mm.

Entfernen Sie bei Bedarf die Überwurfmuttern und Platten, um die mitgelieferten 8 mm- bzw. 12 mm-Schlauchtüllen und -klemmen zu montieren.

- Um Beschädigungen der Thermostatanschlüsse zu vermeiden, verwenden Sie beim Entfernen/Installieren der externen Anschlüsse einen 19 mm-Gabelschlüssel.

Achten Sie darauf, dass der Ablaufhahn an der Vorderseite des Bads geschlossen ist und alle Wasseranschlüsse fest sitzen.

Um ein Überlaufen zu vermeiden, stellen Sie alle Anwendungsbehälter vor dem Befüllen in das Bad.

Befüllen Sie das Bad so, dass ein Arbeitsbereich von 2,0 cm bis 4,0 cm von der Oberkante erhalten bleibt.

- Vermeiden Sie ein Überfüllen, da Flüssigkeiten auf Ölbasis sich unter Erwärmung ausdehnen.

- Kühlbäder müssen vor Inbetriebnahme 24 Stunden bei ca. 25 °C aufrecht stehen.

Starten Sie das Thermostat erst, nachdem Sie die Badflüssigkeit dem Behälter hinzugegeben haben. Halten Sie zusätzliche Flüssigkeit griffbereit.

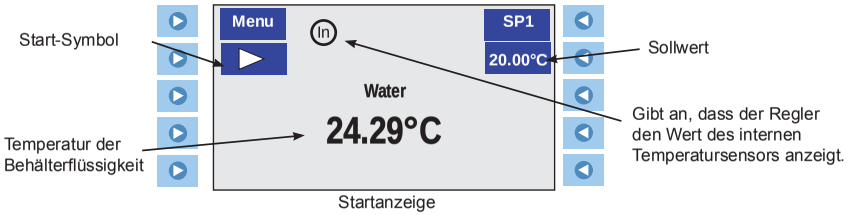
Stellen Sie bei Kühlbädern den Stromkreisschutz an der Rückseite des Bads auf die Position **I**.

Stellen Sie bei allen Thermostaten den Stromkreisschutz an der Rückseite auf die Position **I**. Die blaue LED auf dem vorderen Bedienfeld beginnt zu leuchten.

3. Drücken Sie auf ⏻; der Regler zeigt vorübergehend Thermo Scientific und dann die Startanzeige an.

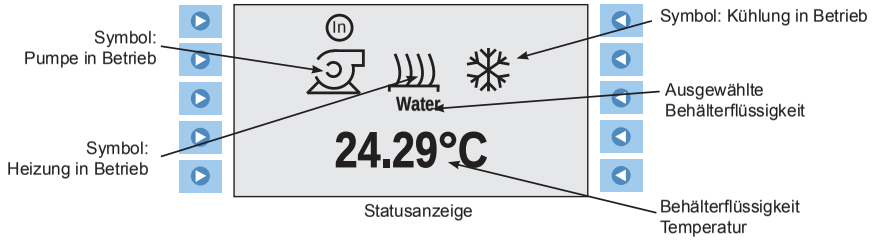
Drücken Sie links vom Start-Symbol ▶ auf ▷. Das Gerät startet und das Start-Symbol verwandelt sich in ein Stopp-Symbol ■.

3.



4. Drücken Sie ggf. auf esc, um die Statusanzeige einzublenden. Drücken Sie auf esc, um zwischen der Start- und der Statusanzeige umzuschalten.

4.



Überprüfen Sie nach dem Starten alle Wasseranschlüsse auf undichte Stellen.

Stellen Sie den Übertemperaturschutz (HTC) ein; siehe Handbuch.

⚠ Ce guide de démarrage rapide est destiné à la mise en marche initiale uniquement. Pour toute autre procédure, merci de vous référer au manuel. De plus, si l'une de ses étapes ne vous paraît pas claire, télécharger le manuel avant de commencer.

Sécurité :

- Les bains ont été conçus pour fonctionner exclusivement à l'intérieur. Ne jamais exposer le bain à une chaleur ou une humidité excessive, à une ventilation inadéquate ou à des matières corrosives.
- Brancher le bain à une prise correctement reliée à la terre.
- Ne jamais faire fonctionner un appareil dont le cordon d'alimentation est endommagé.
- Les réfrigérants sont plus lourds que l'air et peuvent remplacer l'oxygène, provoquant ainsi une perte de connaissance. Tout contact avec des réfrigérants qui fuient peut provoquer des brûlures cutanées. Pour plus d'informations concernant les précautions d'utilisation et de mise au rebut, se reporter à la plaque signalétique du bain et à la Fiche de données de sécurité (MSDS) du fabricant la plus récente.
- Déplacer le bain avec soin, les secousses soudaines et les chutes pouvant endommager ses composants. À chaque déplacement de l'équipement, toujours le mettre hors tension et le débrancher de son alimentation.
- Ne jamais utiliser jamais un équipement endommagé ou qui présente des fuites.
- Ne jamais utiliser l'équipement lorsque le réservoir du bain est vide.
- S'assurer qu'aucun tuyau n'entre en contact avec le cordon d'alimentation.
- Une température de fonctionnement extrême induit une température extrême à la surface des tuyaux. Cette température est encore plus dangereuse lorsque la buse est métallique.
- Vérifier que les tuyaux choisis satisfont aux exigences de température et de pression maximales.
- Éviter d'appliquer des contraintes mécaniques aux tuyaux et veiller à ne pas dépasser le rayon de pliage spécifié.
- Toujours mettre le circulateur hors tension et débrancher le cordon d'alimentation de la source d'alimentation avant d'installer le plateau ou le pont en option.
- Utiliser uniquement les liquides approuvés et énumérés dans le Tableau 1. Avant d'utiliser un quelconque liquide susceptible d'entraîner un ledit liquide, se reporter à la Fiche de données de sécurité du fabricant pour les précautions d'utilisation et de mise au rebut. Se reporter également à la Fiche de données de sécurité pour les exigences de ventilation.

Tableau 1. Liquides approuvés :

Eau filtrée/mono-distillée (pH 7-8)
Eau désionisée (1 à 3 MΩ-cm, compensée)
Eau distillée avec biocide Nalco et ses inhibiteurs
Eau distillée avec chlore (5 ppm)
Glycol de qualité laboratoire/eau 0 à 75 %

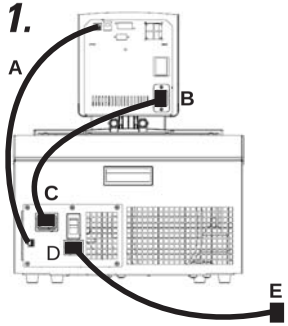
SIL 100 SYNTH 60
SIL 180 SYNTH 260
SIL 300

- Lorsque la température de l'eau est supérieure à 80°C, surveiller le niveau des liquides. Il devra être régulièrement complété. De la vapeur d'eau est également générée.
- Les mélanges d'eau et de glycol doivent être réajustés et complétés par de l'eau pure. Si tel n'est pas le cas, le pourcentage de glycol augmente, ce qui accroît la viscosité du mélange et diminue ses performances.

Matériel nécessaire pour commencer :

- Clé à molette
- Tuyau et accessoires de plomberie appropriés
- Colliers de serrage de dimension appropriée

1.



Le dispositif de protection du circuit est conçu pour protéger le circulateur. Le cordon d'alimentation du circulateur est conçu pour servir de dispositif de déconnexion. Placer ainsi le circulateur de sorte à pouvoir accéder facilement au cordon.

La plaque signalétique située à l'arrière du bain en indique les caractéristiques électriques spécifiques. Les écarts de tension admissibles sont de ±10 %. La prise doit prendre en charge la puissance totale de l'appareil.

- S'assurer que les câbles n'entrent pas en contact avec les raccordements des tuyaux ou la tuyauterie.

1A. Bains réfrigérés : effectuer tous les raccordements électriques et de communication avant le démarrage du système.

- Ne jamais raccorder la prise d'alimentation du contrôleur (B) à une prise de courant. Toujours, et uniquement, raccorder la prise de courant (C) à un circulateur.

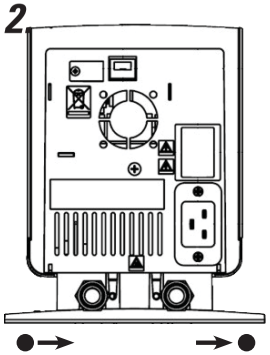
Installer le câble de communication fourni **(A)** entre le circulateur et les connecteurs RJ45 du bain.

Raccorder le cordon d'alimentation du connecteur **(B)** au connecteur du bain **(C)**.

Brancher le cordon d'alimentation du bain **(D)** sur une prise de courant avec mise à la terre **(E)**.

1B. Bains non réfrigérés : l'alimentation électrique **(B)** doit être reliée directement à une prise de courant avec mise à la terre **(E)**.

2.



2. Les raccordements du circuit externe se trouvent à l'arrière du circulateur. → ● correspond au flux de retour de l'application externe. ● → correspond au flux de sortie vers l'application externe. Les raccordements ont un diamètre extérieur de 16 mm.

Au besoin, retirer les écrous-raccords et les plaques afin d'installer les raccords cannelés et les colliers de serrage de 8 mm ou 12 mm fournis.

- Afin d'éviter d'endommager la tuyauterie du circulateur, utiliser une clé de maintien de 19 mm pour retirer/installer les connexions externes.

S'assurer que l'orifice de vidange, situé à l'avant du bain est fermé et que tous les raccordements de tuyauterie sont sécurisés (verrouillés et étanches).

Pour éviter les éclaboussures, placer les conteneurs de l'application dans le bain avant de remplir ce dernier.

Remplir la zone de travail du bain entre 2,0 et 4,0 cm en dessous du bord supérieur.

- Éviter de trop remplir le bain, les liquides à base d'huile augmentant de volume avec la chaleur.

- Laisser les bains réfrigérés à la verticale et à environ 25°C pendant 24 heures avant toute mise en marche.

Ne pas démarrer le circulateur tant que le réservoir du bain ne contient pas de liquide. Conserver une quantité de liquide supplémentaire à proximité.

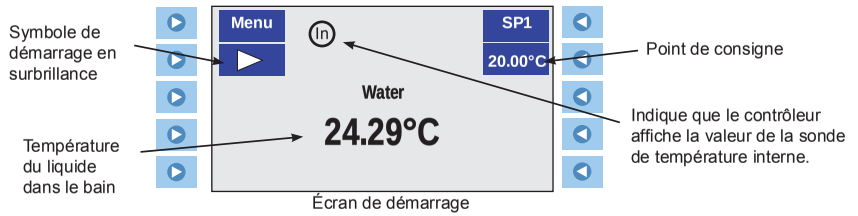
Bains réfrigérés : placer le dispositif de protection du circuit situé à l'arrière du bain sur la position **I**.

Tous les circulateurs : placer le dispositif de protection du circuit situé à l'arrière sur la position **I**. La LED bleue située sur le panneau avant s'allume.

3. Appuyer sur ⏻ - le contrôleur affiche momentanément **Thermo Scientific**, suivi de l'écran de démarrage.

Appuyer sur ▶ à gauche du symbole de démarrage, ▶. L'appareil démarre ; le symbole de démarrage se transforme en symbole d'arrêt, ■.

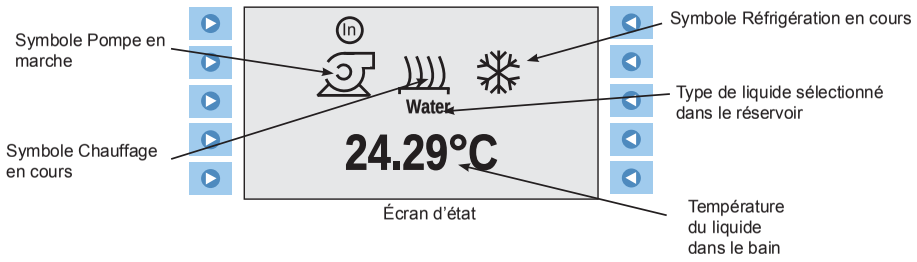
3.



Écran de démarrage

4. Au besoin, appuyer sur esc pour appeler l'écran d'état. Appuyer sur esc pour basculer entre l'écran de démarrage et l'écran d'état.

4.



Écran d'état

Après le démarrage, vérifier tous les raccordements de tuyauterie à la recherche d'éventuelles fuites.

Régler le dispositif de sécurité du point de coupure haute température (HTC). Se reporter au manuel d'utilisation.

⚠ Esta guía de puesta en marcha rápida se ha elaborado únicamente para el arranque inicial. Para obtener información sobre otros procedimientos, debe consultar el manual. Asimismo, en caso de que tuviera dudas sobre alguno de estos pasos, descargue el manual antes de continuar.

Seguridad:

- El baño está destinado exclusivamente para uso en interiores. No lo coloque nunca en lugares con calor o humedad excesivos o ventilación inadecuada, ni en presencia de materiales corrosivos.
- Conecte el baño a una toma de tierra adecuada.
- En caso de que el cable de alimentación esté dañado, no utilice el equipo.
- Los refrigerantes son más pesados que el aire, por lo que sustituirán al oxígeno y provocarán la pérdida del conocimiento. En caso de que entre en contacto con el refrigerante procedente de fugas, se producirán quemaduras en la piel. Consulte la placa identificativa del baño y la hoja de datos de seguridad de materiales (MSDS) más actual del fabricante para obtener información sobre la eliminación y las precauciones de manipulación.
- Mueva el baño con cuidado, ya que las caídas o los saltos repentinos pueden dañar los componentes. Apague siempre el equipo y desconéctelo de la tensión eléctrica antes de moverlo.
- Nunca ponga en funcionamiento un equipo que esté dañado o que presente fugas.
- No utilice el equipo hasta que haya añadido el líquido al depósito de baño.
- Asegúrese de que ninguno de los tubos entra en contacto con el cable de alimentación.
- Las temperaturas de funcionamiento extremas se transmitirán a la superficie del tubo; esto origina más daños con las boquillas metálicas.
- Asegúrese de que los tubos seleccionados cumplen los requisitos necesarios de temperatura y presión máximas.
- No someta los tubos a presión mecánica y asegúrese de que no se supere el radio de curvatura especificado.
- Apague siempre el circulador y desconecte el cable de la fuente de alimentación antes de instalar la plataforma o el puente opcional.
- Utilice únicamente los líquidos aprobados que se muestran en la Tabla 1. Antes de utilizar otros líquidos que puedan entrar en contacto con el líquido, consulte las hojas de datos de seguridad de materiales (MSDS) del fabricante para obtener información sobre la eliminación y las precauciones de manipulación. Consulte también la MSDS para conocer los requisitos de ventilación.

Tabla 1. Líquidos aprobados:

Agua filtrada/destilada (pH 7 - 8)
Agua desionizada (1-3 MΩ-cm, compensada)
Agua destilada con inhibidor y biocida Nalco
Agua destilada con cloro (5 ppm)
Agua/glicol para laboratorio al 0 – 75 %

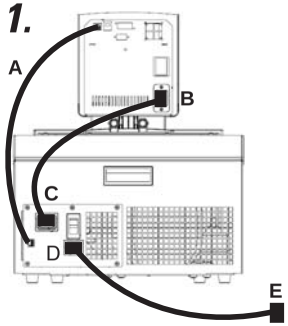
SIL 100	SYNTH 60
SIL 180	SYNTH 260
SIL 300	

- Al utilizar agua por encima de 80 °C para monitorizar el nivel de líquido, será necesario rellenar el líquido con frecuencia. Además, también se origina vapor.
- En las mezclas de agua/glicol, es necesario rellenar con agua pura; de lo contrario, aumentará el porcentaje de glicol y se producirá un aumento de la viscosidad y una disminución del rendimiento.

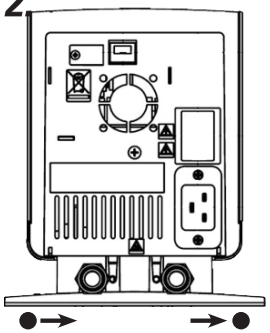
Materiales necesarios:

- Una llave inglesa ajustable
- Manguera o elementos de fontanería apropiados
- Abrazaderas de manguera de tamaño adecuado

1.



2



La protección del circuito está diseñada para proteger el circulador. El cable de alimentación del circulador está diseñado para actuar como dispositivo de desconexión; coloque el circulador de forma que permita acceder al cable con facilidad.

Consulte los requisitos eléctricos concretos que aparecen en la placa con el nombre del baño, situada en la parte trasera. Se permite una desviación de tensión de ± 10 %. La toma de corriente debe admitir el consumo de energía total.

- Asegúrese de que los cables no entren en contacto con los tubos ni con las conexiones de fontanería.

1A. Para baños refrigerados: establezca todas las conexiones eléctricas y de comunicación suministradas antes de comenzar.

- Nunca conecte la entrada de alimentación del controlador, B, a una toma de corriente. Nunca conecte la toma de alimentación, C, a ningún otro aparato que no sea un circulador.

Instale el cable de comunicaciones suministrado, **A**, entre el circulador y los conectores RJ45 del baño.

Instale el cable de alimentación del conector, **B**, al conector del baño, **C**.

Conecte el cable de alimentación del baño, **D**, a una toma de corriente con derivación a tierra, **E**.

1B. Para baños no refrigerados: la fuente de alimentación, **B**, se conecta directamente a una toma de corriente con derivación a tierra, **E**.

2. Las conexiones de fontanería para la circulación externa se encuentran en la parte trasera del circulador.

● → representa el flujo de retorno procedente de la aplicación externa.
→ ● representa el flujo de salida hacia la aplicación externa. Las conexiones tienen un diámetro externo de 16 mm.

Si lo desea, retire las placas y tuercas para instalar las abrazaderas y conexiones dentadas de 8 o 12 mm que se suministran.

- Para evitar que se produzcan daños en la fontanería del circulador, utilice una llave inglesa fija de 19 mm para retirar o instalar las conexiones externas.

Asegúrese de que el orificio de desagüe, situado en la parte delantera del baño, esté cerrado y de que todas las conexiones de fontanería estén bien apretadas.

Para evitar salpicaduras, introduzca los recipientes de la aplicación en el baño antes de llenarlo.

Llene el área de trabajo del baño dejando entre 2,0 cm (0,79 pulg.) y 4,0 cm (1,57 pulg.) por debajo del tope.

- No llene el baño en exceso; los líquidos a base de aceite se expanden con el calor.
- Los baños refrigerados deben mantenerse durante 24 horas en posición vertical y a unos 25 °C antes de su puesta en marcha.

No ponga en marcha el circulador hasta que haya añadido el líquido al depósito de baño. Tenga a mano líquido adicional.

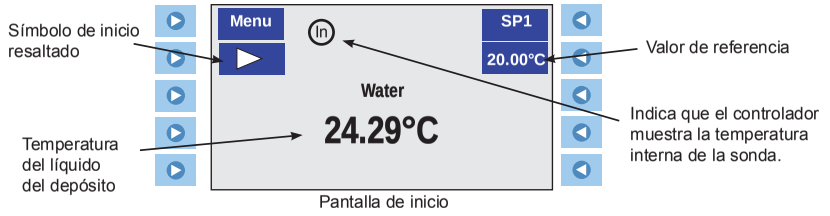
En los baños refrigerados, coloque el protector del circuito, situado en la parte trasera del baño, en la posición de encendido, **I**.

Para todos los circuladores, coloque el protector de circuito, situado en la parte trasera, en la posición de encendido **I**. El indicador LED azul del panel frontal se iluminará.

3. Pulse ⏻; el controlador mostrará brevemente Thermo Scientific y aparecerá la pantalla inicial.

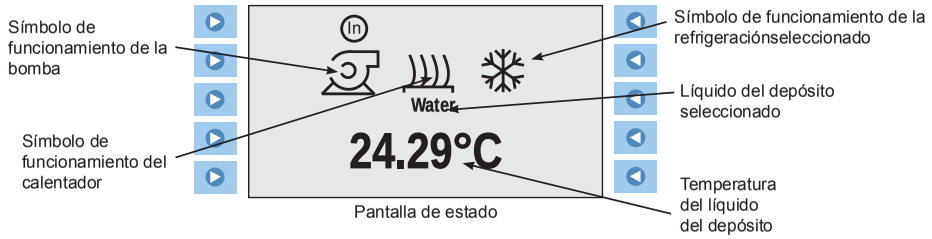
Pulse ↵, a la izquierda del símbolo de puesta en marcha, ▶. La unidad arrancará y el símbolo se convertirá en un símbolo de pausa, ■.

3.



4. Si lo desea, pulse esc para que aparezca la pantalla de estado. Pulse esc para alternar entre las pantallas de inicio y estado.

4.



Una vez puesta en marcha la unidad, revise todas las conexiones de fontanería para detectar posibles fugas.

Ajuste el corte de temperatura alta (HTC) del dispositivo de seguridad; consulte el manual..

⚠ La presente guida rapida è destinata a fornire indicazioni riguardanti esclusivamente la messa in servizio. Per qualsiasi altra procedura fare riferimento al manuale. Qualora in questa guida rapida siano presenti passaggi poco chiari, scaricare il manuale prima di procedere.

Sicurezza:

- Il bagno è destinato esclusivamente all'utilizzo in ambienti chiusi. Non posizionare mai il bagno in un luogo eccessivamente caldo o nel quale siano presenti umidità, ventilazione inadeguata o materiali corrosivi.
- Collegare il bagno ad una presa dotata di messa a terra.
- Non azionare mai l'apparecchio in presenza di un cavo di alimentazione danneggiato.
- I refrigeranti sono più pesanti dell'aria e sostituiscono l'ossigeno causando perdita di coscienza. Il contatto con eventuali perdite di refrigerante può causare ustioni cutanee. Fare riferimento alla targhetta e all'ultima scheda di sicurezza sui materiali (MSDS) fornita dal produttore per le indicazioni su gestione e smaltimento.
- Spostare il bagno con cautela: sobbalzi improvvisi o cadute possono danneggiarne i componenti. Spegnere sempre l'apparecchio e scollegarlo dalla tensione di alimentazione prima di spostarlo.
- Non azionare mai apparecchi danneggiati o che presentino perdite.
- Non azionare mai l'apparecchio senza aver inserito il liquido nel serbatoio del bagno.
- Assicurarsi che nessun tubo entri in contatto con il cavo di alimentazione.
- Temperature di esercizio estreme determinano temperature estreme sulla superficie dei tubi. Questo aspetto riveste un'importanza maggiore con gli ugelli in metallo.
- Assicurarsi che i tubi scelti soddisfino i requisiti massimi di temperatura e pressione.
- Non sottoporre i tubi a deformazione meccanica e assicurarsi che non venga superato il raggio di piegatura specificato.
- Spegnere sempre il circolatore e scollegare il cavo di alimentazione dalla fonte di alimentazione prima di installare la piattaforma o il ponte opzionali.
- Usare esclusivamente i liquidi approvati elencati nella Tabella 1. Prima di usare qualsiasi liquido con il quale è probabile che si verifichi un contatto, fare riferimento all'MSDS fornita dal produttore per le indicazioni su gestione e smaltimento. Fare riferimento all'MSDS anche per i requisiti di aerazione.

Tabella 1. Liquidi approvati:

Acqua filtrata/a singola distillazione (pH 7-8)
Acqua deionizzata (1-3 MΩ-cm, compensata)
Acqua distillata con biocida e inibitore Nalco
Acqua distillata con cloro (5 ppm)
Soluzione di glicole e acqua a grado di laboratorio da 0 a 75%

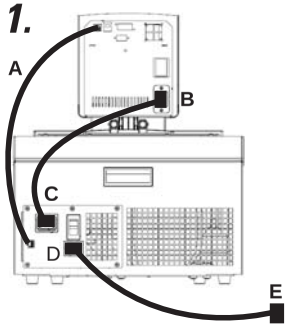
SIL 100	SYNTH 60
SIL 180	SYNTH 260
SIL 300	

- Monitorare il livello del liquido quando si utilizza acqua oltre gli 80 °C; potrebbero essere necessari rabbocchi frequenti. Viene inoltre generato vapore.
- Le miscele di acqua/glicole richiedono rabbocchi con acqua pura; in caso contrario, la percentuale di glicole aumenta determinando un incremento della viscosità a discapito del rendimento.

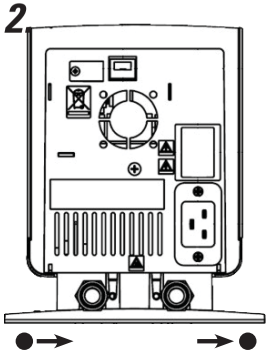
Elementi necessari per iniziare:

- Una chiave inglese
- Tubature adeguate
- Fascette per tubi di dimensioni adeguate

1.



2



La protezione di circuito serve a proteggere il circolatore. Il cavo di alimentazione del circolatore è progettato per funzionare quale dispositivo di interruzione; posizionare il circolatore in modo tale che il cavo possa essere raggiunto con facilità.

Fare riferimento alla targhetta del bagno posta sul retro del bagno stesso per i requisiti elettrici. Sono ammesse deviazioni di tensione di ±10%. La presa deve essere ritenuta idonea per il consumo di energia totale.

- Assicurarsi che i cavi non entrino in contatto con i collegamenti dei tubi o con i tubi stessi.

1A. Per i bagni refrigerati eseguire tutti i collegamenti elettrici e di comunicazione prescritti prima di iniziare.

- Non collegare mai la presa di ingresso dell'alimentazione elettrica del controller, B, ad una presa di corrente. Non collegare mai la presa di allacciamento, C, a elementi diversi dal circolatore.

Installare il cavo di comunicazione fornito, **A**, tra il circolatore e i connettori RJ45 del bagno.

Installare il cavo di alimentazione dal connettore, **B**, al connettore posto sul bagno, **C**.

Collegare il cavo di alimentazione del bagno, **D**, a una presa di corrente dotata di messa a terra, **E**.

1B. Per i bagni non refrigerati il cavo di alimentazione, **B**, deve essere collegato direttamente a una presa di corrente dotata di messa a terra, **E**.

2. I collegamenti dei tubi per la circolazione esterna si trovano sul lato posteriore del circolatore.

→● indica il flusso di ritorno dall'applicazione esterna. ●→ indica il flusso di uscita verso l'applicazione esterna. I connettori hanno un diametro esterno di 16 mm.

Se lo si desidera, rimuovere i dadi e le piastre di raccordo e installare le fascette e i raccordi da 8 o da 12 mm forniti.

- Onde evitare danni alle tubature del circolatore, usare una controchiave da 19 mm per la rimozione/l'installazione dei collegamenti esterni.

Assicurarsi che la portella di scarico posta sul lato anteriore del bagno sia chiusa e che tutti i collegamenti dei tubi siano fissati.

Onde evitare riversamenti, posizionare tutti i contenitori nel bagno prima di procedere al riempimento.

Riempire l'area di lavoro del ba gno fino a 2,0 cm (3/4") — 4,0 cm (1 1/2") al di sotto dell'orlo.

- Non riempire eccessivamente; i liquidi a base oleosa si espandono quando riscaldati.
- Lasciare i bagni refrigerati in posizione verticale ad una temperatura di ~25 °C per 24 ore prima dell'avvio.

Non azionare il circolatore prima di aver aggiunto il liquido nel serbatoio del bagno. Tenere del liquido di riserva a portata di mano.

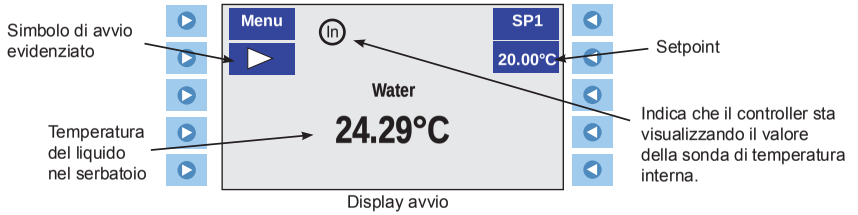
Per i bagni refrigerati, portare il protettore di circuito posto sul lato posteriore dell'apparecchio in posizione **I**.

Per tutti i circolatori, portare il protettore di circuito posto sul lato posteriore in posizione **I**. Il LED blu sul pannello frontale si illumina.

3. Prema , il circolatore visualizzerà momentaneamente Thermo Scientific , in seguito comparirà il pulsante Start Display.

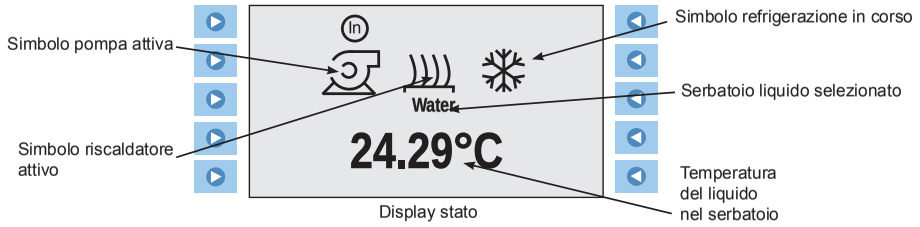
Prema alla sinistra del pulsante di avvio . Il circolatore si avvia e il pulsante di avvio si trasformerà in un Pulsante di stop .

3.



4. Se lo si desidera, premere esc per visualizzare il Display stato. Premere esc per alternare i Display avvio/stato.

4.



Dopo l'avvio, controllare tutti i collegamenti dei tubi per escludere eventuali perdite.

Regolare il dispositivo di sicurezza HTC (High Temperature Cutout); fare riferimento al manuale.

PREMIUM Quick Start handleiding

Veiligheidsmaatregelen:

De unit is alleen ontworpen voor gebruik binnenshuis.

Plaats een unit nooit op een plek met overmatige warmte, vocht, onvoldoende ventilatie of corrosieve materialen.

Gebruik nooit ontvlambare of corrosieve vloeistoffen met deze unit.

Zorg ervoor dat de door u gekozen slangen voldoen aan uw maximale vereisten voor temperatuur en druk.

Raadpleeg voordat u vloeistoffen gebruikt of onderhoud uitvoert op plekken waar waarschijnlijk contact is met vloeistof, de veiligheidsbladen van de fabrikant voor voorzorgsmaatregelen.

Dit heeft u nodig om te kunnen beginnen:

- een verstelbare steeksleutel
- een geschikte slang of leiding
- klemmen of type aansluiting van de juiste grootte

1 Elektrische aansluitingen/communicatie-aansluitingen

De unit is bedoeld voor gebruik op een daartoe geschikt stopcontact. Alle units zijn uitgerust met een automatische, thermisch geactiveerde beveiliging van 20 A.

Deze beveiliging is ontworpen ter bescherming van de controller en is niet bedoeld als vervanging voor de standaardbeveiliging in de elektriciteitsleidingen. Het is de verantwoordelijkheid van de gebruiker om voor een uitschakelinrichting te zorgen. Plaats de unit zodanig dat het niet moeilijk is de uitschakelinrichting te bedienen.

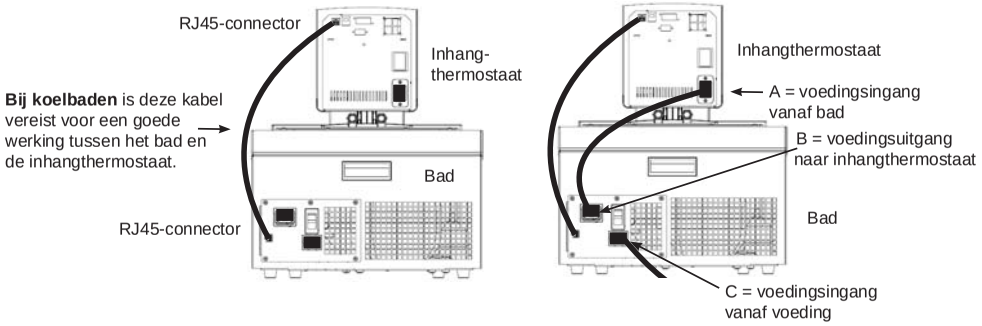
Raadpleeg de naamplaat op de linker bovenhoek aan de achterzijde van het bad voor specifieke elektrische vereisten. Spanningsafwijkingen van ±10% zijn toegestaan. Het stopcontact moet voldoende gedimensioneerd zijn om het totale opgenomen vermogen van de eenheid te kunnen leveren.

Voor koelbaden:
Zorg ervoor dat alle aansluitingen voor communicatie en elektriciteit zijn gemaakt alvorens de unit te starten.

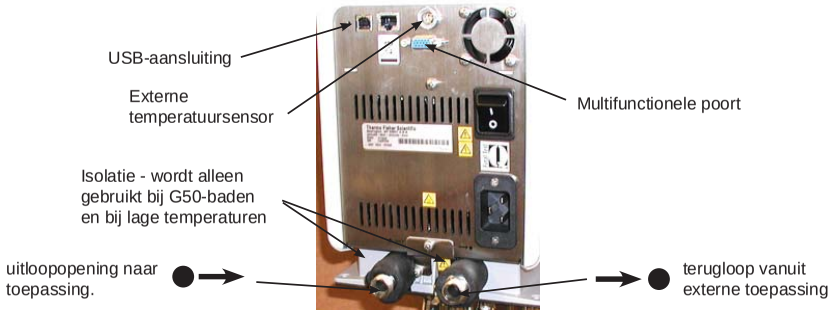
- Installeer de meegeleverde afgeschermde RJ45-kabel tussen de inhangthermostaat en de RJ45-connectoren van het bad (vergelijkbaar met Ethernet). **Dit is nodig voor een goede werking.**
- Installeer de voedingskabel tussen de connector aan de achterkant van de controller, A, en de connector aan de achterkant van het koelbad, B.
- Sluit de voedingskabel van het bad, C, aan op een geaard stopcontact.

Bij koelbaden voedingsingang A van de controller nooit aansluiten op een stopcontact. Voedingsuitgang B nooit aansluiten op iets anders dan een inhangthermostaat.

Zorg ervoor dat de elektrische kabels niet in contact komen met vloeistofaansluitingen of -leidingen.



2 Aansluitingen en externe stroming



Aansluitingen inhangthermostaat (normale situatie)

Van slangen wordt normaal gebruik gemaakt om de pomp aan een externe toepassing aan te sluiten.

De leidingaansluitingen voor externe circulatie bevinden zich aan de achterkant van de inhangthermostaat. Verwijder de moeren en beschermkapjes om de met de unit meegeleverde 8 mm- of 12 mm-slangaansluitingen en -klemmen te kunnen installeren.

Zorg ervoor dat de afvoeropening van het reservoir aan de voorkant van de unit *gesloten* is en dat alle leidingaansluitingen goed aangesloten zijn.

Plaats alvorens het bad te vullen de houders van uw toepassing in het bad om morsen te voorkomen.

Vul het werkgedeelte van het bad tot een hoogte tussen 2,0 cm (3/4”) en 4,0 cm (1 1/2”) vanaf de rand, zie aanvaardbare vloeistoffen hieronder.

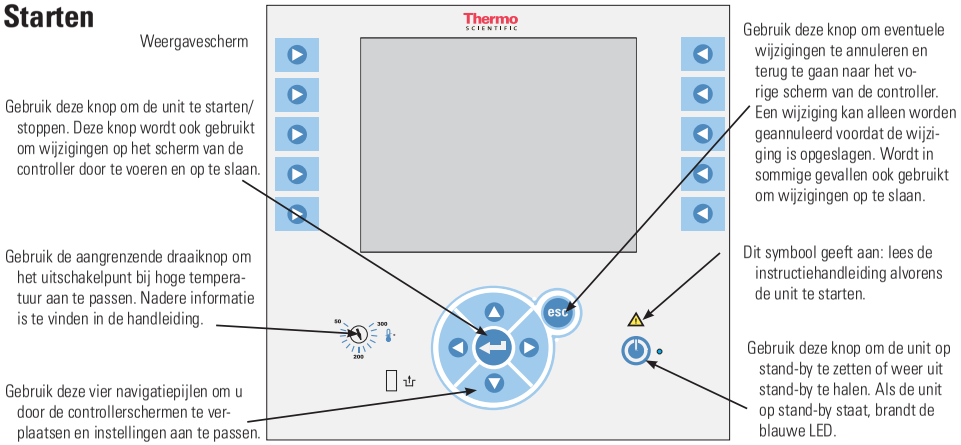
Maak het bad niet te vol, vloeistoffen op oliebasis zetten bij verwarming uit.

Bij verpompen naar een extern systeem extra vloeistof bij de hand houden om het juiste niveau in de circulatieleidingen en het externe systeem in stand te houden. Bewaak bij het verwarmen van de vloeistof het vloeistofniveau.

Aanvaardbare vloeistoffen/grenswaarden:

Vloeistoffen en grenswaarden:	**Min °C**	**Max °C**
SYNTH 60	-50	45
SYNTH 260	45	250
SIL 100	-75	75
SIL 180	-40	200
SIL 200	20	200
SIL 300	80	300
Water	5	95
EG/water	-30	100
Anders	-90	300

Starten

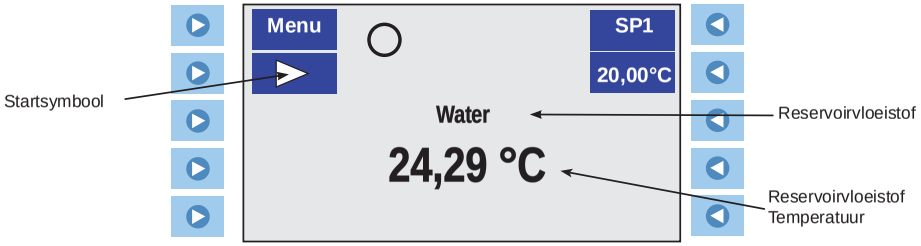

Weergavescherm
Gebruik deze knop om de unit te starten/ stoppen. Deze knop wordt ook gebruikt om wijzigingen op het scherm van de controller door te voeren en op te slaan.
Gebruik de aangrenzende draaiknop om het uitschakelpunt bij hoge temperatuur aan te passen. Nadere informatie is te vinden in de handleiding.
Gebruik deze vier navigatiepijlen om u door de controllerschermen te verplaatsen en instellingen aan te passen.
Gebruik deze knop om eventuele wijzigingen te annuleren en terug te gaan naar het vorige scherm van de controller. Een wijziging kan alleen worden geannuleerd voordat de wijziging is opgeslagen. Wordt in sommige gevallen ook gebruikt om wijzigingen op te slaan.
Dit symbool geeft aan: lees de instructiehandleiding alvorens de unit te starten.
Gebruik deze knop om de unit op stand-by te zetten of weer uit stand-by te halen. Als de unit op stand-by staat, brandt de blauwe LED.
esc

Laat koelunits gedurende 24 uur bij kamertemperatuur (~25 °C) rechtop staan alvorens te starten. Hiermee wordt gewaarborgd dat de smeerolie helemaal kan teruglopen naar de compressor.

Alvorens de unit te starten alle USB-aansluitingen (optie), elektrische aansluitingen en vloeistofaansluitingen extra goed controleren.

De unit niet laten werken voordat er vloeistof in de unit is gevuld. Houd extra vloeistof bij de hand. Raadpleeg de handleiding als de unit niet start.

- Bij koelbaden de zekering aan de achterzijde van het bad in de stand **I** plaatsen.
- Voor alle units de beveiliging aan de achterzijde van de inhangthermostaat in de stand **I** plaatsen, de unit gaat over op stand-by.
- Druk op , de controller geeft kortstondig **Thermo Scientific** weer en vervolgens verschijnt het startscherm.



Startscherm

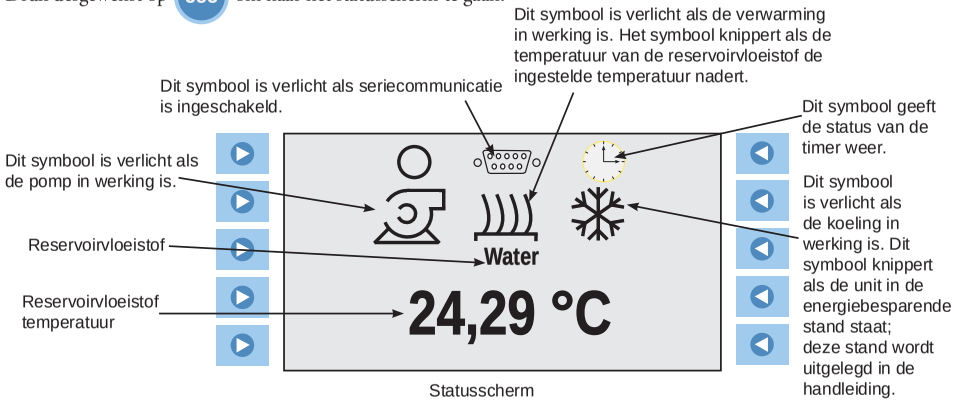
- Druk op links van het startsymbool, . De unit zal starten en het startsymbool verandert in een stopsymbool, .

Controleer na het starten alle leidingverbindingen op lekkage.

De gedeelten **Menu** en **SP1** bovenin het scherm worden gebruikt om de instellingen van de inhangthermostaat te bekijken en/of te wijzigen. Deze functies worden in de handleiding in detail uitgelegd.

In geeft aan dat de controller voor het regelen van de temperatuur gebruik maakt van zijn interne sensor.
Ex wordt weergegeven als de externe sensor is geselecteerd voor het regelen van de temperatuur.

Druk desgewenst op esc om naar het statusscherm te gaan.


Dit symbool is verlicht als de verwarming in werking is. Het symbool knippert als de temperatuur van de reservoirvloeistof de ingestelde temperatuur nadert.
Dit symbool is verlicht als seriecommunicatie is ingeschakeld.
Dit symbool geeft de status van de timer weer.
Dit symbool is verlicht als de pomp in werking is.
Dit symbool is verlicht als de koeling in werking is. Dit symbool knippert als de unit in de energiebesparende stand staat; deze stand wordt uitgelegd in de handleiding.
Reservoirvloeistof
Reservoirvloeistof temperatuur
Water
24,29 °C

Statusscherm

Druk desgewenst op esc om te wisselen tussen het startscherm en het statusscherm.

Uitschakelen

- Druk op links van het stopsymbool, . De unit zal stoppen en het stopsymbool verandert in een startsymbool, .
- Druk op . Het scherm van de controller gaat uit en de blauwe LED licht op om aan te geven dat de unit in stand-by staat.
- Zet de beveiliging aan de achterzijde van de inhangthermostaat in de stand **O**. De blauwe LED gaat uit.
- Bij koelbaden de beveiliging aan de achterzijde van het bad in de stand **O** plaatsen.

⚠ Den här snabbstartguiden är endast avsedd att användas vid den första starten. För övriga procedurer ska du läsa handboken. Om du är osäker på något av nedanstående steg ska du också ladda ned och läsa handboken innan du fortsätter.

Säkerhet:

- Badet är endast avsett för inomhusbruk. Placera aldrig badet på ett ställe som är onormalt varmt, fuktigt eller dåligt ventilerat, eller där frätande material förekommer.
- Anslut badet till ett jordat eluttag.
- Använd aldrig utrustningen om nätsladden är skadad.
- Kylmedierna är tyngre än luft och kommer att tränga undan syret, vilket leder till medvetslöshet. Ett läckande kylmedium orsakar brännskador om det kommer i kontakt med huden. Läs märkplåten på badet och senaste MSDS:n från tillverkaren om hanteringsrutiner och kassering.
- Var försiktig när du flyttar badet. Plötsliga stötar eller fall kan skada dess komponenter. Stäng alltid av utrustningen och dra ut nätsladden innan du flyttar den.
- Använd aldrig utrustning som är skadad eller läcker.
- Använd aldrig utrustningen om badets vätskebehållare är tom.
- Säkerställ att inga slangar kommer i kontakt med nätsladden.
- Extrema drifttemperaturer leder till extrema temperaturer vid slangytan. Detta blir ännu mer kritiskt med metallmunstycken.
- Kontrollera att den slang du har valt uppfyller kraven för maxtemperatur och maxtryck.
- Utsätt inte slangarna för mekaniskt slitage och kontrollera att eventuella böjningsradier som angetts inte överskrids.
- Stäng alltid av cirkulatorn och dra ut nätsladden från strömkällan innan du installerar den plattformen (tillval) eller bryggan (tillval).
- Använd endast de godkända vätskor som visas i tabell 1. Innan du använder någon vätska som kan tänkas komma i kontakt med huden ska du läsa MSDS:n från tillverkaren om hanteringsrutiner och kassering. Läs även i MSDS:n om ventilationskrav.

Tabell 1. Godkända vätskor:

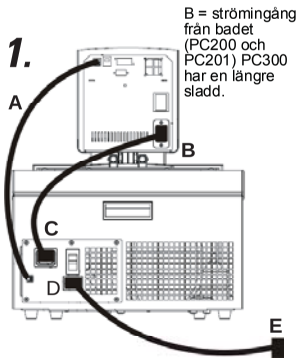
Filtrerat/enkeldestillerat vatten (pH 7–8)	
Avjoniserat vatten (1–3 MΩ-cm, kompenserat)	
Destillerat vatten med Nalco-biocid/-hämmare	
Destillerat vatten med klor (5 ppm)	
0–75 % laboratorieklassad glykol/vatten	
SIL 100	SYNTH 60
SIL 180	SYNTH 260
SIL 300	

- Om vatten med en temperatur över 80 °C används till att övervaka vätskenivån kräver det regelbundna påfyllningar. Det bildas även ånga.
- Vatten/glykol-blandningar måste fyllas på med rent vatten annars ökar procenthalten glykol, vilket leder till hög viskositet och försämrade prestanda.

Du behöver följande för att komma igång:

- en skiftnyckel
- lämpliga slangar eller rör
- slangklämmor av lämplig storlek.

1.



B = strömingång från badet (PC200 och PC201) PC300 har en längre sladd.

Kretskyddet är utformat för att skydda cirkulatorn. Nätsladden till cirkulatorn är utformad för att fungera som en frånkopplingsenhet. Placera cirkulatorn så att du enkelt kommer åt nätsladden.

Läs märkplåten på badets baksida för särskilda elektriska krav. Spänningsavvikelser på ± 10 % är tillåtna. Eluttaget måste vara klassat som lämpligt för den totala strömförbrukningen.

- Säkerställ att inte sladdarna kommer i kontakt med något av de anslutna rören eller någon av de anslutna slangarna.

1A. För kylbad ska alla kommunikationsanslutningar och elektriska anslutningar göras före start.

- Anslut aldrig styrenhetens strömingång (B) till ett eluttag. Strömingången (C) får endast anslutas till cirkulatorn.

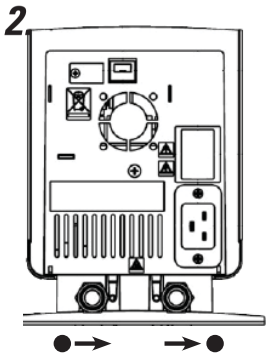
Anslut den medföljande kommunikationskabeln (**A**) mellan cirkulatorn och badets RJ45-anslutningar.

Anslut strömsladden från anslutningen (**B**) till anslutningen (**C**) på badet.

Anslut badets strömsladd (**D**) till ett jordat eluttag (**E**).

1B. För icke-kylda bad går strömsladden (**B**) direkt till ett jordat eluttag (**E**).

2.



2. Röranslutningar för extern cirkulation sitter på baksidan av cirkulatorn.

→● är återflödet från den externa enheten. ●→ är utflödet till den externa enheten. Ytterdiametern för anslutningarna är 16 mm.

Om du vill kan du ta bort anslutningsmuttrarna och tillhörande brickor och installera de medföljande slangnipplarna och slangklämmorna för 8 eller 12 mm.

- För att undvika skador på cirkulatorns rör ska en säkerhetsnyckel på 19 mm användas när de externa anslutningarna tas bort eller installeras.

Kontrollera att dräneringsporten på badets framsida är stängd och att alla röranslutningar är säkra.

Placera eventuella enhetsbehållare i badet före fyllning för att undvika spill.

Fyll badets arbetsområde från 2,0 till 4,0 cm under den övre kanten.

- Undvik överfyllning; oljebaserade vätskor expanderar när de värms upp.
- Låt kylbad stå i upprätt läge i ~25 °C i 24 timmar före start.

Starta inte cirkulatorn förrän vätska har fyllts på i badets behållare. Se till att ha extra vätska till hands.

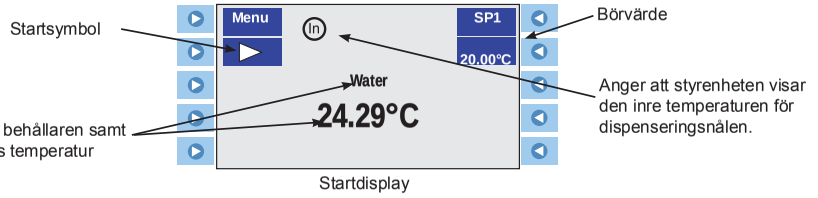
På kylbad ska kretsskyddet på baksidan av badet ställas i läget **I**.

På alla cirkulatorer ska kretsskyddet på baksidan ställas i läget **I**. Den blå lysdioden på frontpanelen tänds.

3. Tryck på ⏻ så visas startdisplayen.

Tryck på ◧ till vänster om startsymbolen, ▶, Cirkulatorn startar och startsymbolen ändras till en stoppsymbol, ■. Pumpen startar direkt, men för kompressorn tar det 30 sekunder.

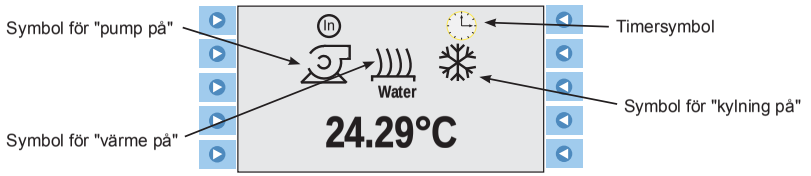
3.



Startdisplay

4. Om du vill kan du trycka på esc för att visa statusdisplayen. Tryck på esc för att växla mellan start- och statusdisplayen.

4.



Statusdisplay

Efter start ska alla röranslutningar kontrolleras så att de inte läcker.

Justera säkerhetsenheten för avstängning vid höga temperaturer (High Temperature Cutout, HTC) enligt anvisningarna i handboken.

⚠ Bu hızlı başlangıç kılavuzu yalnızca ilk çalıştırma prosedürüne yöneliktir. Diğer tüm prosedürler için kılavuza bakın. Ayrıca, burada yer alan adımlarla ilgili emin olmadığınız noktalar varsa devam etmeden önce kılavuzu indirin.

Güvenlik:

- Banyo yalnızca kapalı mekanda kullanıma yöneliktir. Banyoyu hiçbir zaman aşırı sıcak, nemli, yeterli havalandırması olmayan veya aşındırıcı malzemelerin bulunduğu bir ortama yerleştirmeyin.
- Banyoyu uygun şekilde topraklanmış bir prize bağlayın.
- Güç kablosu hasarlı olan ekipmanı asla çalıştırmayın.
- Soğutucu akışkanlar havadan ağır olduklarından ortamdaki oksijenin yerine geçerek bilinç kaybına yol açabilir. Sızan soğutucu akışkanlarla temas edilmesi ciltte yanıklarına yol açar. Kullanımla ilgili önlemler ve ürünün atılması hakkında bilgi için banyonun ad plakasına ve üreticinin en güncel Malzeme Güvenlik Bilgi Formuna (MSDS) bakın.
- Banyoyu taşırken dikkatli olun; ani sarsıntılar veya ürünün düşürülmesi bileşenlere zarar verebilir. Ekipmanı taşımadan önce mutlaka kapalı konuma getirin ve şebeke bağlantısını kesin.
- Hasarlı veya sızıntı yapan ekipmanı asla çalıştırmayın.
- Banyonun haznesinde sıvı yokken ekipmanı asla çalıştırmayın.
- Hortumlardan hiçbirinin güç kablosuyla temas etmediğinden emin olun.
- Aşırı çalışma sıcaklıkları tüp yüzeyinin aşırı ısınmasına yol açacaktır; bu durum, metal nozüller kullanıldığında daha da ciddi bir hal alır.
- Seçtiğiniz hortumların maksimum sıcaklık ve basınç gereksinimlerinizi karşıladığından emin olun.
- Hortumları mekanik gerilime maruz bırakmayın ve belirtilen bükme yarıçaplarının aşılmadığından emin olun.
- İsteğe bağlı platformu veya köprüyü kurmadan önce mutlaka sirkülatörü kapatın ve güç kablosunun güç kaynağı bağlantısını kesin.
- Yalnızca Tablo 1'de gösterilen onaylı sıvıları kullanın. Sıvıyla temasın gerçekleşebileceği yerlerde herhangi bir sıvı kullanmadan önce kullanımla ilgili önlemler ve ürünün atılması hakkında bilgi için üreticinin MSDS belgesine bakın. Havalandırma gereksinimleri için de MSDS belgesine bakın.

Tablo 1. Onaylı Sıvılar:

Filtrelenmiş/bir kez damıtılmış su (pH 7-8)
Deiyonize su (1-3 MΩ-cm, dengelenmiş)
Nalco biyosit ve inhibitör eklenmiş damıtılmış su
Klor eklenmiş damıtılmış su (5 ppm)
%0 ila %75 Laboratuvar Sınıfı Glikol/Su

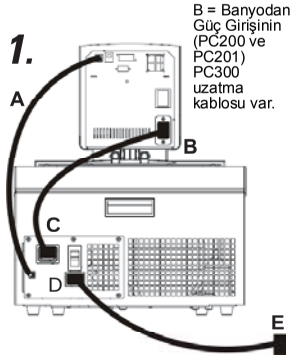
SIL 100	SYNTH 60
SIL 180	SYNTH 260
SIL 300	

- 80°C'nin üzerinde su kullanırken sıvı seviyesini izleyin; sık sık ekleme yapılması gerekecektir. Ayrıca buhar da oluşacaktır.
- Su/glikol karışımları saf su ile ekleme yapılmasını gerektirir; aksi halde glikol yüzdesi artarak yüksek viskoziteye ve düşük performansa neden olur.

Başlangıç için gerekli malzemeler:

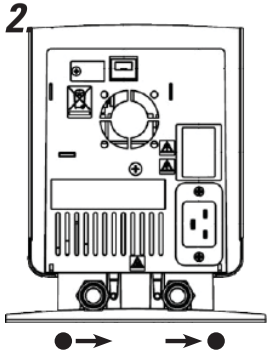
- İngiliz anahtarı
- Uygun hortum veya boru
- Uygun boyda hortum kelepçeleri

1.



B = Banyodan Güç Girişinin (PC200 ve PC201) PC300 uzatma kablosu var.

2



Devre koruması, sirkülatörün korunması için tasarlanmıştır. Sirkülatörün hat kablosu, bağlantı kesme aracı olarak kullanılmak üzere tasarlanmıştır; sirkülatörü kabloya rahatlıkla erişilebilecek bir şekilde konumlandırın.

Spesifik elektrik gereksinimleri için banyonun arka tarafındaki ad plakasına bakın. ± %10'luk gerilim sapmalarına izin verilir. Priz, toplam güç tüketimine uygun değerde olmalıdır.

- Kabloların boru bağlantılarıyla veya hortumlarla temas etmediğinden emin olun.

1A. Soğutmalı banyolar için ürünü çalıştırmadan önce ürünle birlikte verilen tüm iletişim ve elektrik bağlantılarını yapın.

- Kontrolör güç girişini (B) asla bir prize bağlamayın. Güç çıkışını (C) asla sirkülatör dışında bir yere bağlamayın.

Ürünle birlikte verilen iletişim kablosunu (**A**) kullanarak sirkülatör ile banyo RJ45 konektörlerini birbirine bağlayın.

Güç kablosunu kullanarak konektörü (**B**), banyo üzerindeki konektöre (**C**) bağlayın.

Banyonun güç kablosunu (**D**) topraklı bir prize (**E**) bağlayın.

1B. Soğutmasız banyolar için güç kaynağı (**B**) doğrudan topraklı bir prize (**E**) bağlanır.

2. Harici sirkülasyon için boru bağlantıları sirkülatörün arka tarafında bulunmaktadır.

→● harici uygulamadan gelen dönüş akışıdır. ●→ harici uygulamaya giden çıkış akışıdır. Bağlantılar 16 mm'lik bir dış çapa sahiptir.

İsteğe bağlı olarak, rakorları ve plakaları sökerek ürünle birlikte verilen 8 veya 12 mm'lik hortum uçlarını ve kelepçelerini takabilirsiniz.

- Sirkülatör borularının zarar görmesini önlemek için harici bağlantıları sökerken/takarken destek anahtarı olarak bir 19 mm anahtar kullanın.

Banyonun ön tarafındaki tahliye portunun kapalı olduğundan ve tüm boru bağlantılarının sabitlendiğinden emin olun.

Dökülmeleri önlemek için dolum yapmadan önce tüm uygulama kaplarını banyonun içine yerleştirin.

Banyo çalışma alanını en üst kısımdan 2,0 cm (3/4") ila 4,0 cm (1 1/2") pay bırakarak doldurun.

- Daha fazla miktarda sıvı doldurmayın; yağ bazlı sıvılar ısındığında genleşir.
- Soğutmalı banyoları, çalıştırmadan önce ~25°C'de dik konumda 24 saat süreyle beklemeye bırakın.

Banyo haznesine sıvı eklenmeden sirkülatörü çalıştırmayın. Hazırda fazladan sıvı bulundurun.

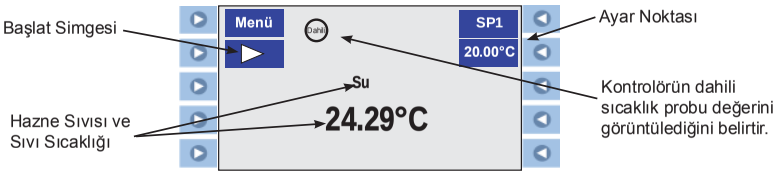
Soğutmalı banyolar için banyonun arka tarafında bulunan devre koruyucusunu **I** konumuna getirin.

Tüm sirkülatörler için arka tarafta bulunan devre koruyucusunu **I** konumuna getirin. Ön paneldeki mavi LED yanar.

3. düğmesine basın, Başlangıç Ekranı görüntülenir.

Başlat simgesinin soluna basın . Sirkülatör çalışır ve başlat simgesi durdur simgesine dönüşür. Pompa derhal çalışır, fakat kompresörün çalışması 30 saniye kadar sürer.

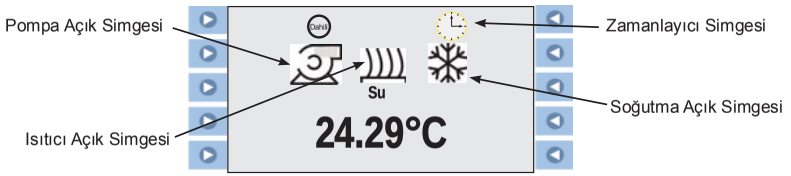
3.



Başlangıç Ekranı

4. İsterseniz esc düğmesine basarak Durum Ekranını görüntüleyebilirsiniz. Başlangıç/Durum Ekranları arasında geçiş yapmak için esc düğmesine basın.

4.



Durum Ekranı

Ürünü çalıştırdıktan sonra sızıntı olup olmadığını belirlemek için tüm boru bağlantılarını kontrol edin.

Yüksek Sıcaklık Kapatma (HTC) güvenlik cihazını ayarlayın; kılavuza bakın.

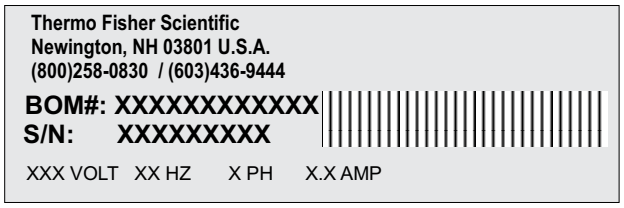
Preface

Compliance

Refer to the Declaration of Conformity in the back of this manual.

After-sale Support

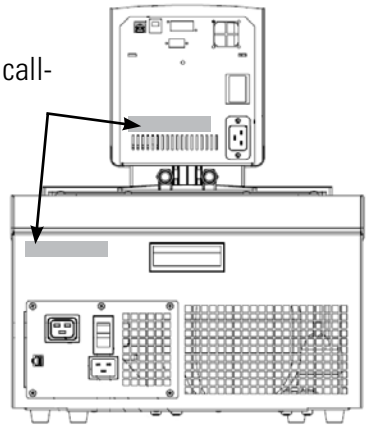
Thermo Fisher Scientific is committed to customer service both during and after the sale. If you have questions concerning the unit operation, or questions concerning spare parts or Service Contracts, call our Sales, Service and Customer Support phone number, see this manual's inside cover for contact information.



Sample Nameplate

There can be up to three nameplates located on the rear of the unit. Before calling, please obtain the serial number printed on the complete system nameplate located on the upper rear of the bath.

Nameplate
Refer to nameplate when calling for after-sale support



Nameplates (Typical Locations)

Feedback

We appreciate any feedback you can give us on this manual. Please e-mail us at tcmanuals@thermofisher.com. Be sure to include the manual part number and the revision date listed on the front cover.

Unpacking

Retain all cartons and packing material until the unit is operated and found to be in good condition. If the unit shows external or internal damage contact the transportation company and file a damage claim. Under ICC regulations, this is your responsibility.

Refrigerated units should be left in an upright position for 24 hours before starting. This will ensure the lubrication oil has drained back into the compressor. ▲

Section 1 Safety

Safety Warnings

Make sure you read and understand all instructions and safety precautions listed in this manual before installing or operating the circulator. If you have any questions concerning the operation or the information in this manual, please contact us. See inside cover for contact information.

DANGER indicates an imminently hazardous situation which, if not avoided, *will* result in death or serious injury.

WARNING indicates a potentially hazardous situation which, if not avoided, *could* result in death or serious injury.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It is also be used to alert against unsafe practices.

The lightning flash with arrow symbol, within an equilateral triangle, is intended to alert the user to the presence of non-insulated "dangerous voltage" within the circulator's enclosure. The voltage magnitude is significant enough to constitute a risk of electrical shock.

This label indicates the presence of hot surfaces.

This label indicates read the manual.

Observe all warning labels. ▲

Never remove warning labels. ▲

Leave refrigerated baths in an upright position at room temperature (~25°C) for 24 hours before starting. This ensures the lubrication oil drains into the compressor. ▲

The circulator's construction provides protection against the risk of electrical shock by grounding appropriate metal parts. The protection will not function unless the power cord is connected to a properly grounded outlet. It is the user's responsibility to assure a proper ground connection is provided. ▲

Operate the circulator using only the supplied line cord. The circulator's power cord is the disconnecting device, it must be easily accessible at all times. ▲

The circuit protector located on the rear of the circulator is not intended to act as a disconnecting means. ▲

Never operate the bath with the immersion circulator removed. ▲

Do not mount the circulator backwards on the bath; the line cord could contact the reservoir fluid. Ensure the electrical cords do not come in contact with any of the plumbing connections or tubing. ▲

Never place the circulator in a location or atmosphere where excessive heat, moisture, or corrosive materials are present. ▲

Ensure the tubing you select meets your maximum temperature and pressure requirements. ▲

Ensure all communication and electrical connections are made prior to starting the circulator. ▲

Many refrigerants which may be undetectable by human senses are heavier than air and replaces the oxygen in an enclosed area causing loss of consciousness. Refer to the circulator's nameplate and the manufacturer's most current MSDS for additional information. ▲

Never operate the bath without fluid in the reservoir. ▲

Other than water, before using any fluid, or when performing maintenance where contact with the fluid is likely, refer to the manufacturer's MSDS and EC Safety Data sheet for handling precautions. ▲

Ensure, that no toxic gases can be generated by the fluid. Flammable gases can build up over the fluid during usage. ▲

Never use corrosive fluids with this circulator. These fluids voids the manufacturer's warranty. ▲

When using ethylene glycol and water, check the fluid concentration and pH on a regular basis. Changes in concentration and pH can impact system performance. ▲

Ensure the fluid is at a safe temperature (~40°C) before handling or draining. ▲

Never operate damaged or leaking equipment, or with any damaged cords. ▲

Never operate the circulator or add fluid to the reservoir with panels removed. ▲

Do not clean the circulator with solvents, only use a soft cloth and water. ▲

Drain the bath before it is transported and/or stored in, near or below freezing temperatures. ▲

Always turn the circulator off and disconnect the supply voltage from its power source before moving or before performing any service or maintenance procedures. ▲

Transport the circulator with care. Sudden jolts or drops can damage its components. ▲

Refer service and repairs to a qualified technician. ▲

The user is responsible for decontamination if hazardous materials are spilled. Consult the manufacturer regarding decontamination and or cleaning agents compatibility. ▲

Performance of installation, operation, or maintenance procedures other than those described in this manual may result in a hazardous situation and voids the manufacturer's warranty. ▲

Personal Protective Equipment

The are no special personal protective equipment requirements needed to perform normal operation. We do recommend wearing eye protection and gloves.

Training

The user must review and understand all the sections in this manual before operating the bath.

Section 2 General Information

Description and Intended Use

The Thermo Scientific PREMIUM Series of Heated Immersion Circulators are used with refrigerated and heated baths. All circulators can pump to an external system. All circulators have a digital display and easy-to-use touch pad, five programmable setpoint temperatures, acoustic and optical alarms, and offer adjustable high temperature protection.

The circulator is designed for use in a clean laboratory environment and in accordance with the Letter of Compliance located at the end of this manual.

PREMIUM Heated Immersion Circulator

	PC200	PC201	PC300
Temperature Range °C °F	Ambient +13 to +200 Ambient +23 to +392	Ambient +13 to +200 Ambient +23 to +392	Ambient +13 to +300 Ambient +23 to +572
Temperature Stability °C	±0.01	±0.01	±0.01
Heater Capacity 230V/115V watts	2000/1200	3000/NA	3000/NA
Circulator Dimensions (H x W x D) mm inches	421 x 189 x 233 16.6 x 7.4 x 9.2	421 x 189 x 233 16.6 x 7.4 x 9.2	421 x 189 x 233 16.6 x 7.4 x 9.2
Reservoir Depth Requirement mm inches	200 7.9	200 7.9	200 7.9
Net Weight kg lb	4.7 10.4	4.7 10.4	4.7 10.4
Pumping Capacity			
Max flow rate lpm/gpm	24/6.3	24/6.3	24/6.3
Max pressure (mbar/psi)	560/8.1	560/8.1	560/8.1
Max suction (mbar/psi)	380/5.5	380/5.5	380/5.5
Pump speed	Variable (40% - 100%)	Variable (40% - 100%)	Variable (40% - 100%)
Electrical Requirements (Voltage ±10%)	100 V/50 Hz 100 V/60 Hz or 115 V/60 Hz or 200-230 V/50..60 Hz	200-230 V/50..60 Hz	200-230 V/50..60 Hz
Connectivity			
Remote sensor port	Yes	Yes	Yes
USB port	Yes	Yes	Yes
Multi function port	Yes	Yes	Yes
RS232	Optional	Optional	Optional
RS485	Optional	Optional	Optional
Ethernet/LAN	Optional	Optional	Optional
Analog I/O	Optional	Optional	Optional

- Performance specifications established in accordance with DIN 12 876 (using water at 70°C).
- Lower temperature ranges available with supplemental cooling.
- The maximum wall thickness for circulators that have a factory installed clamp is 26 mm.
- Communication options require an accessory box.
- Thermo Fisher Scientific reserves the right to change specifications without notice.

ARCTIC Refrigerated/Heated Bath Circulator Specifications

Stainless Steel Refrigerated/Heated Bath Circulators					
	A24B	**A25**	**A28**	**A28F**	**A40**
PC200 Temperature °C **Range** °F	-24 to 200 -11 to 392	-25 to 200 -13 to 392	-28 to 200 -18 to 392	-28 to 200 -18 to 392	-40 to 200 -40 to 392
Bath Volume liters gallons	16 - 27 4.2 - 7.1	7 - 12 1.8 - 3.2	6 - 10 1.6 - 2.6	6 - 10 1.6 - 2.67	7 - 12 1.8 - 3.2
Cooling Capacity watts	900	500	320	320	900
Refrigerant	R404	R134a	R134a	R134a	R404
Overall Dimensions* (H x W x D) mm inches	612 x 765 x 610 24.1 x 30.1 x 24.0	749 x 273 x 483 29.5 x 10.7 x 19.0	749 x 273 x 483 29.5 x 10.7 x 19.0	558 x 514 x 426 22.0 x 20.2 x 16.8	787 x 385 x 519 31.0 x 15.1 x 20.4
Work Area Dimensions (D x W x L) mm inches	200 x 297 x 313 7.9 x 11.7 x 12.3	200 x 173 x 184 8.0 x 6.8 x 7.2	200 x 173 x 129 8.0 x 6.8 x 5.1	200 x 173 x 129 8.0 x 6.8 x 5.1	200 x 173 x 184 8.0 x 6.8 x 7.2
Net Weight kg lb	58.6 128.9	36.1 79.5	36.0 79.1	35.6 78.3	55.2 121.5
Electrical Requirements** (Voltage ±10%)	100 V/50 Hz 100 V/60 Hz or 115 V/60 Hz or 230 V/50 Hz				

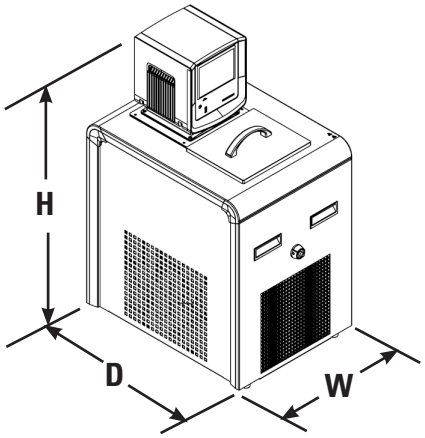
GLACIER Refrigerated Bath Circulator Specifications

G 50 Ultra-Low Refrigerated Bath Circulator	
PC200 Temperature Range °C °F	-50 to 200 -58 to 392
Bath Volume liters gallons	7 - 12 1.8 - 3.2
Cooling Capacity at 20°C	1000 watts
Refrigerant	MO89
Overall Dimensions* (H x W x D) mm inches	851 x 419 x 554 33.5 x 16.5 x 21.8
Work Area Dimensions (D x W x L) mm inches	200.0 x 208.5 x 104.2 7.9 x 8.8 x 4.75
Net Weight kg/lb	62/136
Electrical Requirements** (Voltage ±10%)	200 V/50 Hz or 208-230 V/60 Hz or 230 V/50 Hz

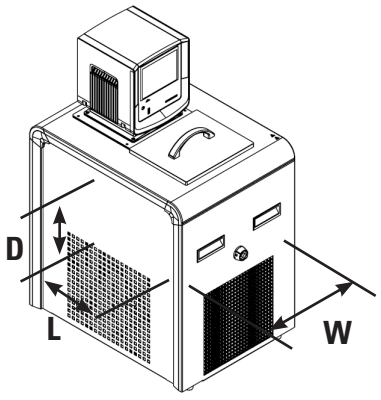
*Add ~26 mm (1 inch) to D for drain fitting.

**See Section 3 for additional information.

- Thermo Fisher Scientific reserves the right to change specifications without notice.



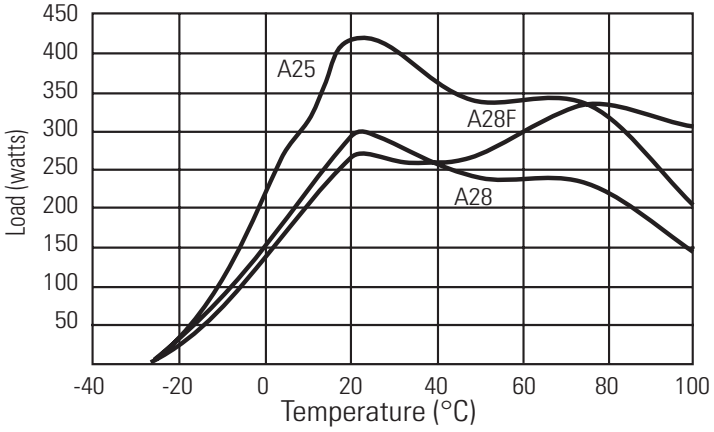
Overall Dimensions



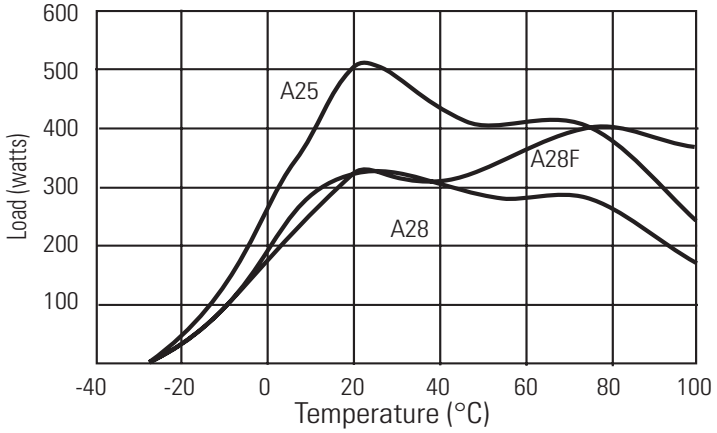
Work Area Dimensions

Cooling Capacity

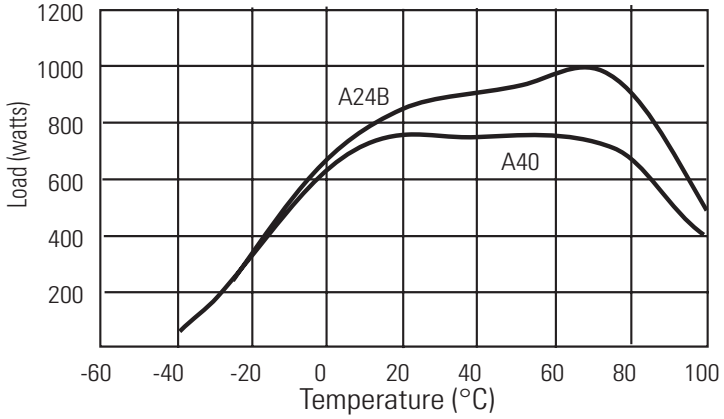
A25, A28, A28F (100V/50Hz)



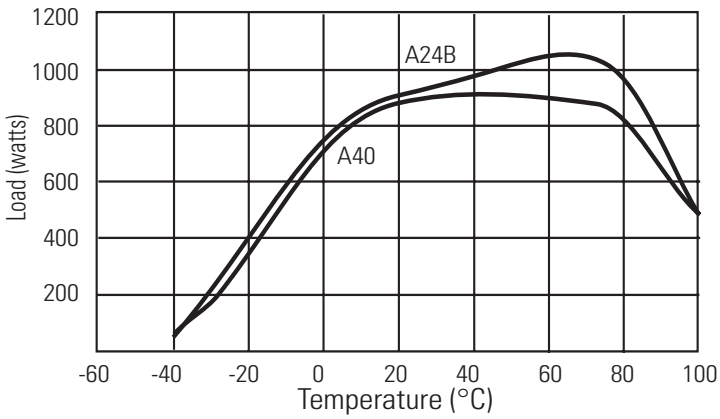
A25, A28, A28F (115V/60Hz, 230V/50Hz, 100V/60Hz)



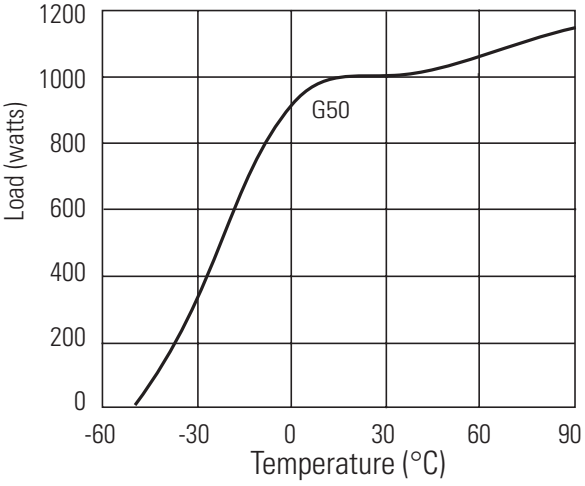
A40, A24B (100V/50Hz)



A40, A24B (115V/60Hz, 230V/50Hz, 100V/60Hz)



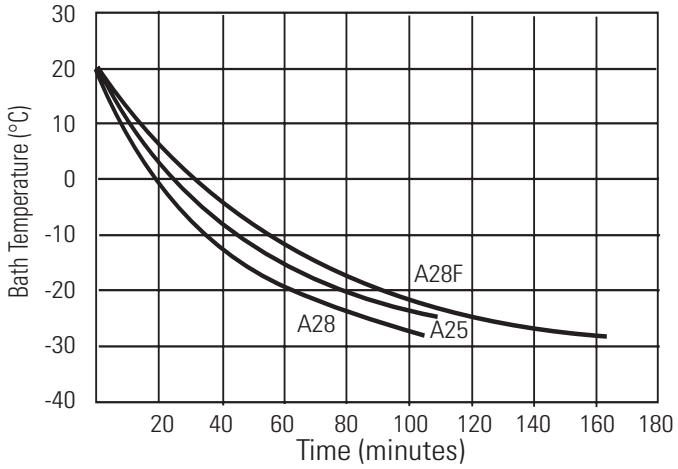
G50 (208-230V/60Hz, 230V/50Hz, 200V/50-60Hz)



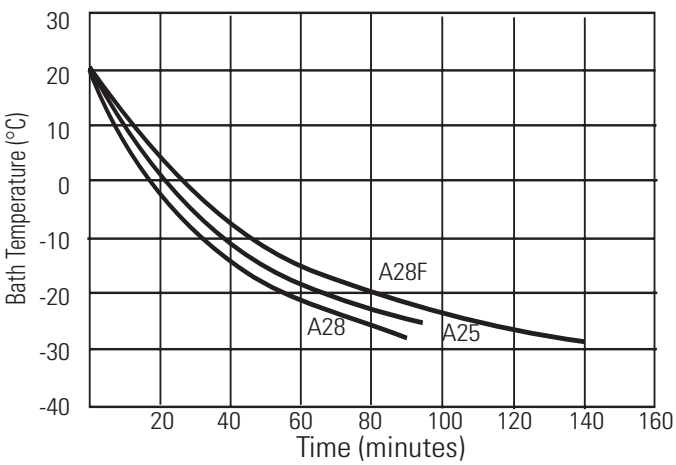
Specifications obtained at sea level using water (above +5°C to +90°C) or a fluid with a specific heat of 2.3 kJ/kg-K or 0.55 Btu/lb-F (less than 5°C) as the recirculating fluid at a +20°C ambient condition, at nominal operating voltage. Other fluids, process temperatures, ambient temperatures, altitude or operating voltage will affect performance. Pump specifications are nominal values of ±10%. Specifications are for reference only and are subject to change

Time to Temperature

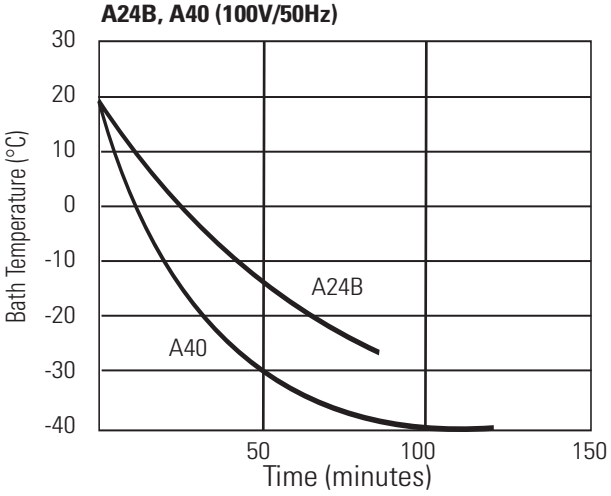
A25, A28, A28F (100V/50Hz)



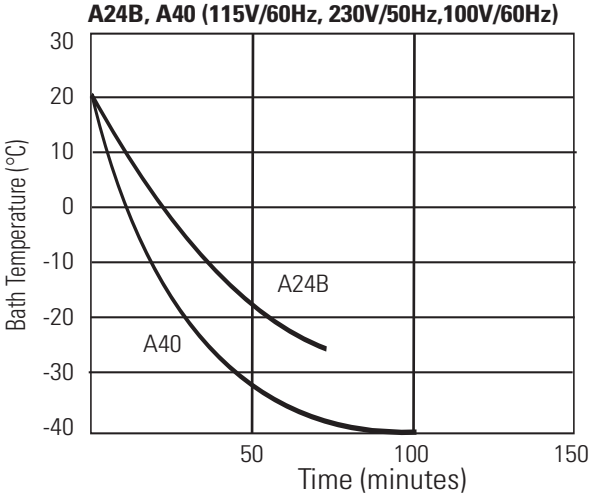
A25, A28, A28F (115V/60Hz, 230V/50Hz,100V/60Hz)



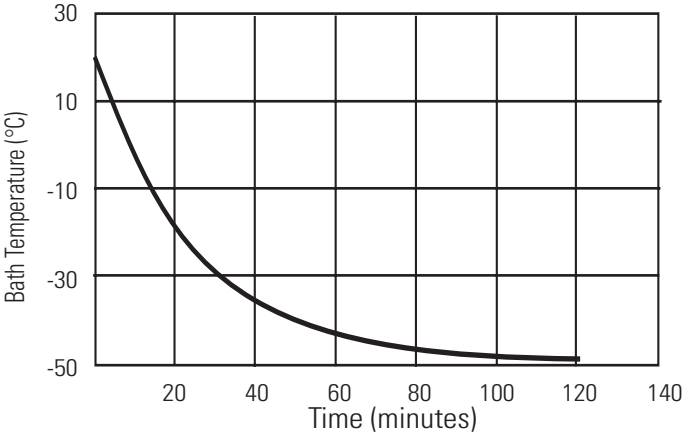
A24B, A40 (100V/50Hz)



A24B, A40 (115V/60Hz, 230V/50Hz,100V/60Hz)



G50 (208-230V/60Hz, 230V/50Hz, 200V/50-60Hz)



Specifications obtained at sea level using water (above +5°C to +90°C) or a fluid with a specific heat of 2.3 kJ/kg-K or 0.55 Btu/lb-F (less than 5°C) as the recirculating fluid at a +20°C ambient condition, at nominal operating voltage. Other fluids, process temperatures, ambient temperatures, altitude or operating voltage will affect performance. Pump specifications are nominal values of ±10%. Specifications are for reference only and are subject to change

SAHARA Heated Bath Circulator Specifications

Stainless Steel Heated Bath Circulators			
	S7	**S13**	**S15**
PC200/201 Temperature Range* °C °F	Ambient +13 to 200 Ambient +23 to 392	Ambient +13 to 200 Ambient +23 to 392	Ambient +13 to 200 Ambient +23 to 392
PC300 Temperature Range* °C °F	Ambient +13 to 300 Ambient +23 to 572	Ambient +13 to 300 Ambient +23 to 572	Ambient +13 to 300 Ambient +23 to 572
Bath Volume liters gallons	4 - 7 1.1 - 1.8	7 - 11 1.8 - 2.9	7 - 17 1.8 - 4.5
Overall Dimensions** (H x W x D) mm inches	494 x 235 x 428 19.5 x 9.2 x 16.7	494 x 321 x 428 19.5 x 12.6 x 16.7	494 x 381 x 457 19.5 x 15.0 x 18.0
Work Area Dimensions (D x W x L) mm inches	200 x 154 x 112 7.9 x 6.1 x 4.4	200 x 293 x 112 7.9 x 9.4 x 4.4	200 x 300 x 141 7.9 x 11.8 x 5.5
Net Weight kg lb	10.6 23.4	12.3 27.0	13.7 30.1
PC200 Electrical Requirements*** (Voltage ±10%)	100-115V/50-60Hz or 200-230V/50-60Hz		
PC201/300 Electrical Requirements*** (Voltage ±10%)	200-230V/50-60Hz		

Stainless Steel Heated Bath Circulators			
	S30	**S45**	**S49**
PC200/PC201 Temperature Range* °C °F	Ambient +13 to 200 Ambient +23 to 392	Ambient +13 to 150 Ambient +23 to 302	Ambient +13 to 200 Ambient +23 to 392
Bath Volume liters gallons	14 - 24 3.7 - 6.3	30 - 41 7.9 - 10.8	29 - 51 7.7 - 13.5
Overall Dimensions** (H x W x D) mm inches	494 x 381 x 628 19.5 x 15.0 x 24.7	594 x 381 x 628 23.4 x 15.0 x 24.7	494 x 579 x 746 19.5 x 22.8 x 29.4
Work Area Dimensions (D x W x L) mm inches	200 x 297 x 312 7.9 x 11.7 x 12.3	300 x 298 x 312 11.8 x 11.7 x 12.3	200 x 498 x 430 7.9 x 19.6 x 16.9
Net Weight kg lb	16.5 36.2	20.3 44.7	24.3 53.4
PC200 Electrical Requirements*** (Voltage ±10%)	100-115V/50-60Hz or 200-230V/50-60Hz		
PC201 Electrical Requirements*** (Voltage ±10%)	200-230V/50-60Hz		

Specifications achieved with reservoir cover removed.

*Lower temperature ranges require supplemental cooling.

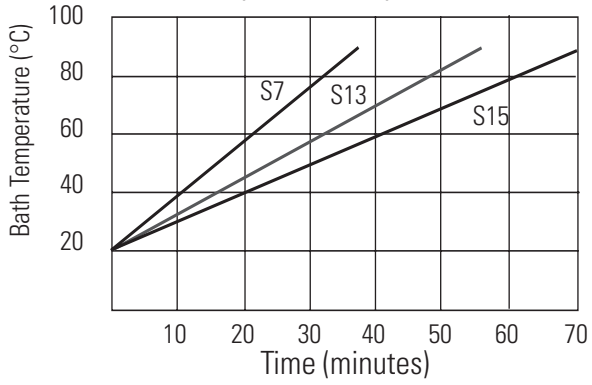
**See page 2-2. Add ~26 mm (1 inch) to D for drain fitting.

***See Section 3 for additional information.

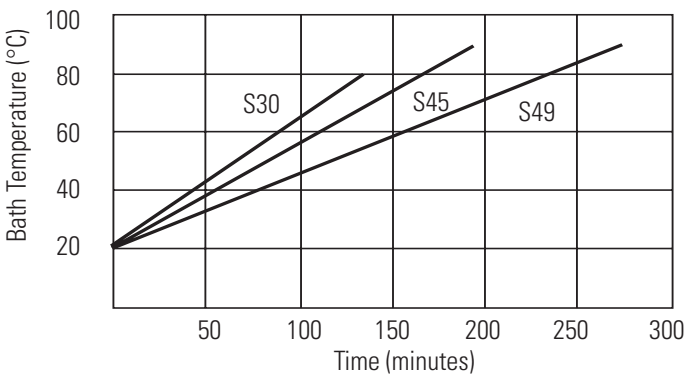
• Thermo Fisher Scientific reserves the right to change specifications without notice.

Time to Temperature

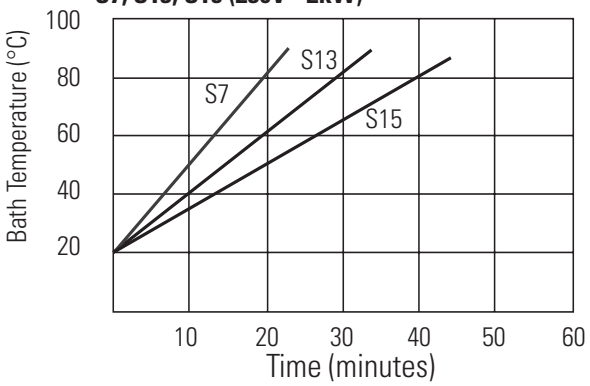
S7, S13, S15 (115V - 1.2kW)



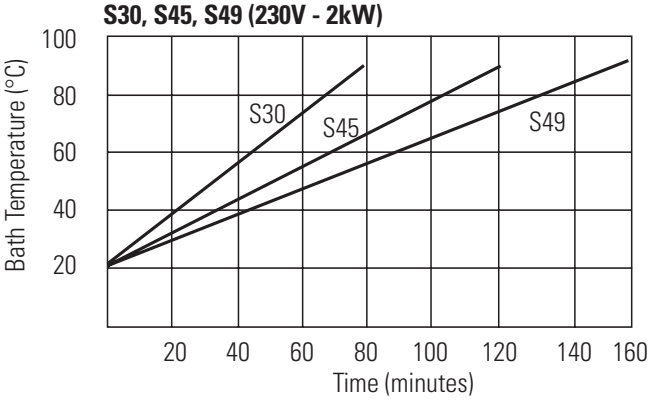
S30, S45, S49 (115V - 1.2kW)



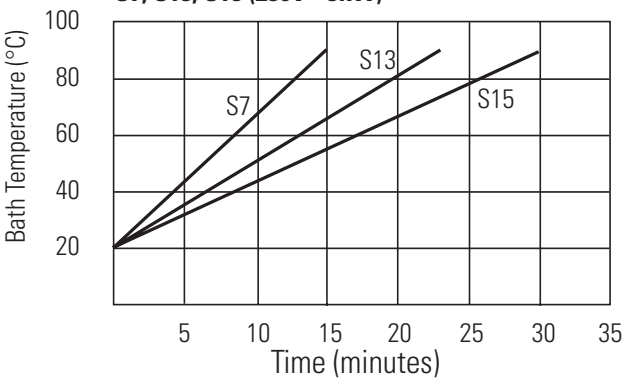
S7, S13, S15 (230V - 2kW)



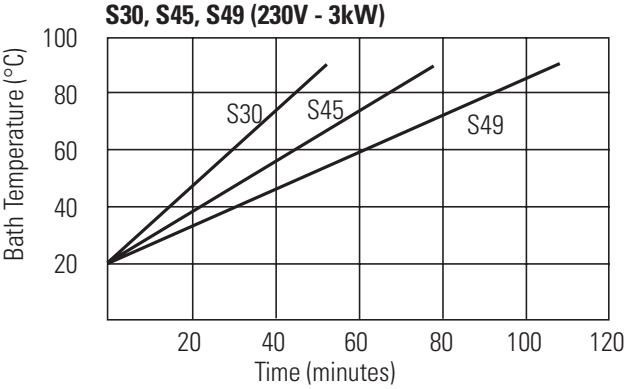
S30, S45, S49 (230V - 2kW)



S7, S13, S15 (230V - 3kW)



S30, S45, S49 (230V - 3kW)



Specifications obtained at sea level using water (above +5°C to +90°C) or a fluid with a specific heat of 2.3 kJ/kg-K or 0.55 Btu/lb-F (less than 5°C) as the recirculating fluid at a +20°C ambient condition, at nominal operating voltage. Other fluids, process temperatures, ambient temperatures, altitude or operating voltage will affect performance. Pump specifications are nominal values of ±10%. Specifications are for reference only and are subject to change. Heat-up rates for the 100V baths will take approximately 25% longer than the 115V.

Wetted Materials

PREMIUM Immersion Circulator

Viton

EPDM

Ryton (PC200/201 only)

Ceramic

Ultem

Vectra

Stainless Steel

Stainless Steel Baths/Circulators

Stainless Steel 316

Stainless Steel 304

EPDM (drain fitting)

Ryton

Zotek-N (cover seal)

Section 3 Installation

Ambient Conditions

Ambient Temperature Range	5°C to 40°C (41°F to 104°F)
Maximum Relative Humidity	80% at 31°C (88°F)
Operating Altitude	Sea Level to 2000 meters (6560 feet)
Overvoltage Category	II
Pollution Degree	2
Degree of Protection	IP 20

Immersion Circulator Only

The immersion circulator is designed for continuous operation and for indoor use.

⚠ CAUTION

Never place the immersion circulator in a location where excessive heat, moisture, inadequate ventilation, or corrosive materials are present. ▲

⚠ CAUTION

Carefully install the immersion circulator to ensure it does not fall into the container or that its line cord does not make contact with the container contents. ▲

For immersion circulators equipped with a bridge:

- The bridge is designed to fit containers that are 400 mm to 800 mm wide.
- Slide the bridge support rods to the desired length and secure them in place with the supplied eight 3 mm Phillips Head screws.
- If possible, secure the bridge to your container using the two supplied thumbscrews.
- The immersion depth is 75 to 145 mm (~3 to 5 $^{3}/_{4}$").

Your container must be sturdy enough to support the weight of the assembly, approximately 3.8 kilograms (8.5 pounds). The circulator is designed for continuous operation and for indoor use only.

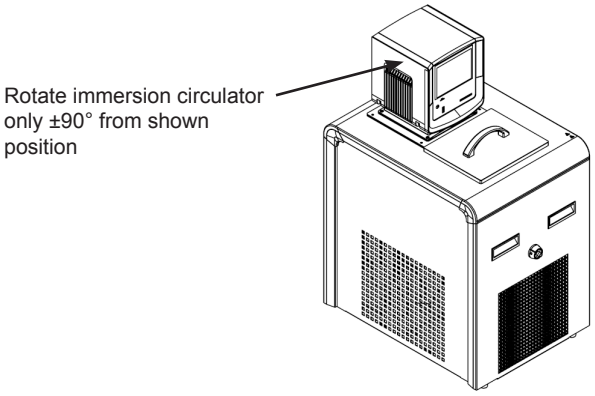
Bath Circulator

Circulators are designed for continuous operation; and for indoor use.

The equipment normally ships with the immersion circulator mounted facing the reservoir. You may change the position ±90° by removing thumb screws, no tools are required.

⚠ CAUTION

Do not mount it backwards; the line cord could contact the reservoir fluid. ▲



⚠ CAUTION

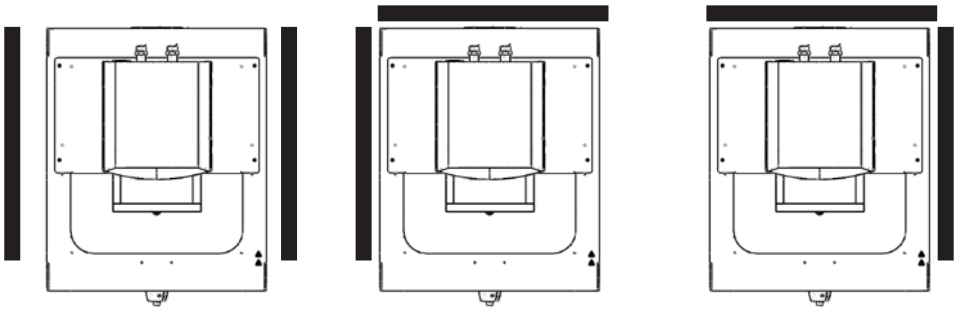
Never place the circulator in a location where excessive heat, moisture, inadequate ventilation, or corrosive materials are present. ▲

⚠ CAUTION

Leave refrigerated baths in an upright position at room temperature (~25°C) for 24 hours before starting. This will ensure the lubrication oil has drained back into the compressor. ▲

Ventilation

The circulator can operate with 0 clearance on two exhaust sides as long as the third exhaust side has unrestricted air flow. Blocked ventilation increases the circulator's temperature, reduce its cooling capacity and, on refrigerated baths, eventually lead to premature compressor failure.



Ventilation Options

Electrical Requirements

DANGER

The circulator's construction provides protection against the risk of electrical shock by grounding appropriate metal parts. The protection will not function unless the power cord is connected to a properly grounded outlet. It is the user's responsibility to assure a proper ground connection is provided. ▲

The circulator is intended for use on a dedicated outlet. All circulators are equipped with automatic thermally-triggered 20 Amp circuit protector.

The circuit protector is designed to protect the circulator.

Note If the circuit protector activates allow the circulator to cool before resetting. Restart the circulator. Contact us if it activates again. ▲

CAUTION

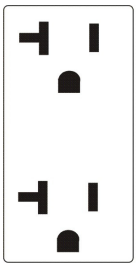
The circulator's power cord is the disconnecting device, it must be easily accessible at all times. ▲

Refer to the nameplate on the rear, upper-left-hand corner of the bath for specific electrical requirements. Voltage deviations of ± 10% are permissible. The outlet must be rated as suitable for the total power consumption, see next page.

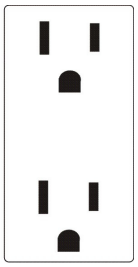
The following power options are available:

Bath	Volts[1]/Hertz/Phase	Amps[2]	Total Wattage	Plug Type
A10B	115/60/1	11.5	1165	N5-15
	100/50-60/1	11.4	1120	N5-15
	230/50/1	10.3	2370	Country Specific
A28/A25	115/60/1	11.7	1185	N5-15
	100/50-60/1	11.5	1135	N5-15
	230/50/1	10.4	2395	Country Specific
A28F	115/60/1	11.5	1165	N5-15
	100/50-60/1	11.4	1120	N5-15
	230/50/1	10.3	2370	Country Specific
A40/A24B	115/60/1	14.4	1660	N5-20
	100/50-60/1	15.3	1525	N5-20
	230/50/1	11.3	2600	Country Specific
G50	200-230/60/1 or 200/50/1	12.9	2980	N6-20
	230/50/1	12.9	2980	Country Specific
PC 200 All Heated Baths/Circulators	115/60/1	11.3	1300	N5-15
	100/50-60/1	10.0	1300	N5-15
	230/50/1	9.3	2135	Country Specific
PC 201/300 All Heated Baths/Circulators	230/50/1	13.6	3140	Country Specific

1. Volts ± 10%
2. Maximum amp draw



20 Amp Outlet
(16 Amp)



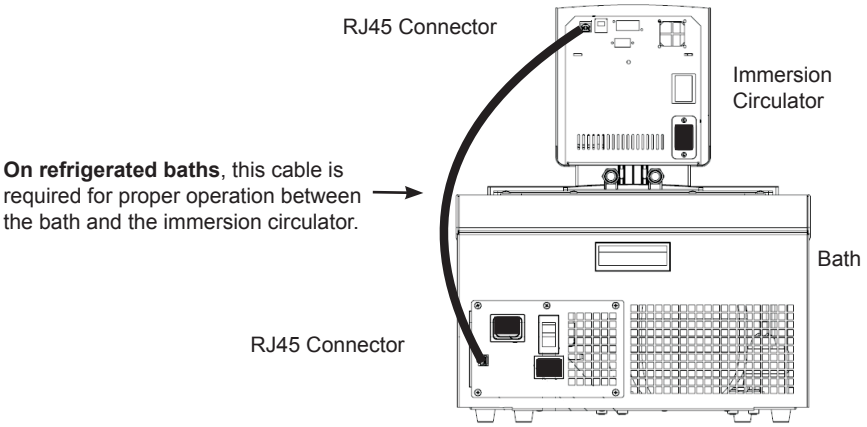
15 Amp Outlet
(12 Amp)

For refrigerated baths (PC200 only):

CAUTION

Ensure all communication and electrical connections are made prior to starting the circulator. ▲

- Install the supplied RJ45 shielded cable between the immersion circulator and the bath RJ45 connectors (similar to Ethernet). **This is required for proper operation.**


RJ45 Connector
Immersion Circulator
On refrigerated baths, this cable is required for proper operation between the bath and the immersion circulator.
Bath
RJ45 Connector

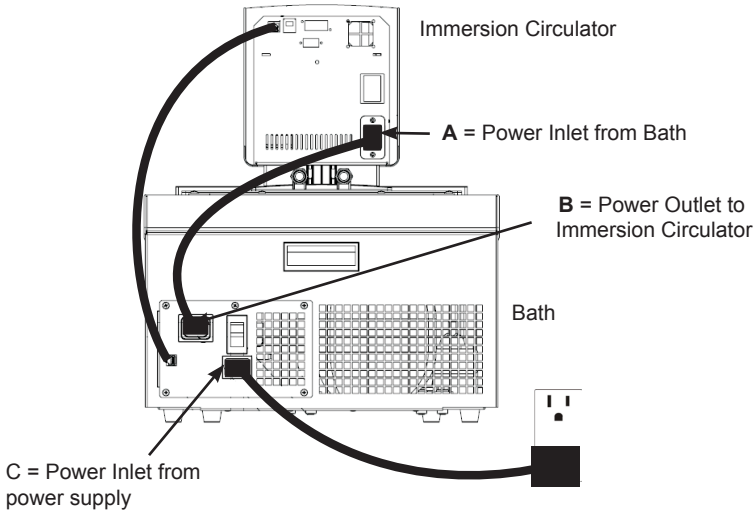
- Install the power cord from the connector on the rear of the circulator, A, to the connector on the rear of the refrigerated bath, B.
- Connect the bath's power cord, C, to a grounded power outlet.

CAUTION

For refrigerated baths, never connect power inlet A to a power outlet. Never connect power outlet B to anything but the circulator. ▲

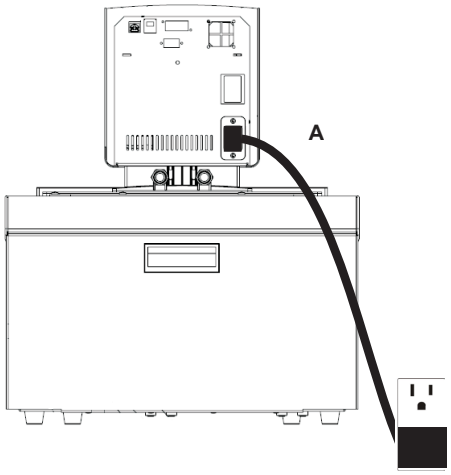
CAUTION

Ensure the electrical cords do not come in contact with any of the plumbing connections or tubing. ▲

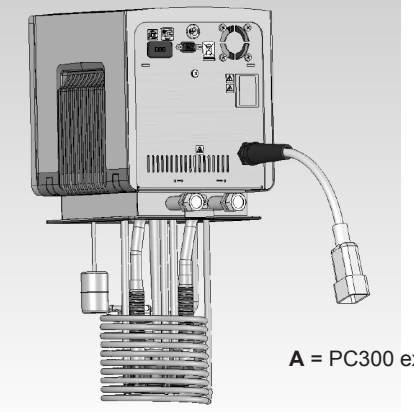

Immersion Circulator
A = Power Inlet from Bath
B = Power Outlet to Immersion Circulator
Bath
C = Power Inlet from power supply

For non-refrigerated baths:

- For PC201 install the power cord from the connector on the rear of the circulator, A, to a grounded power outlet.



- For PC300 install the power cord from the extended cord on the rear of the circulator, A, to a grounded power outlet.



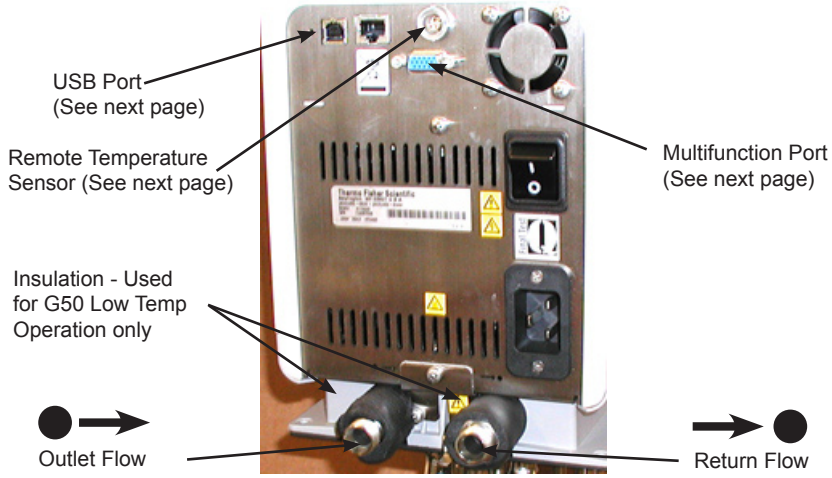
A = PC300 extended power cord

CAUTION

Ensure the electrical cords do not come in contact with any of the plumbing connections or tubing. ▲

External Circulation

The plumbing connections for external circulation are located on the rear of the immersion circulator. → ● is the return flow from the external application. ● → is the outlet flow to the external application (supply side). The connections are 16 mm O.D. Remove the union nuts and plates to install the 8 mm or 12 mm hose barbs and clamps supplied with the circulator.



Connections (Typical)

Note G50 circulators are supplied with 2" pieces of insulation (4 total). For low-temperature operation, install a single piece of insulation on each of the pump lines. ▲

⚠ CAUTION

To prevent damage to the circulator's plumbing, use a 19 mm backing wrench when removing/installing the external connections. ▲

Remote Temperature Sensor

The remote temperature sensor on the rear of the immersion circulator requires a 4-pin connector that must mate to a LEMO # ECP.1S.304.CLL. The immersion circulator uses a 3 wire sensor, but a 4 wire sensor can be used (pins 3 and 4 are interconnected in the control head). The pin-out is:

Pin 1 and 2 = Pt100 + Pin 3 and 4 = Pt100 -

See Section 4 for instructions to enable the remote sensor.

Multifunction Port

The Multifunction port on the rear of the immersion circulator is used in conjunction with an *optional* accessory box to select and activate additional features. See Section 4 for additional information.

USB Port

If your computer does not automatically recognize the USB driver, installation instructions are provided in the Appendix.

Tubing Requirements

⚠ CAUTION

Ensure none of the tubing comes in contact with the power cord. ▲

Tubing is normally used to connect the pump to an external application.

Note The maximum allowable length of tube depends largely on the size, form and material of the external reservoir. The length of tube and its diameter, combined with the circulating capacity, have a large affect on the temperature stability. Whenever possible, use a wider tube diameter and place the application as close as possible to the circulator. ▲

Extreme operating temperatures will lead to extreme temperatures on the tube surface, this is even more critical with metal nozzles. ▲

- the required tube material depends on the heat transfer liquid used
- tubes must not be folded or bent
- after prolonged use, tubes may become brittle or they may get very soft, check them on a regular basis and replace if necessary
- secure all tube connections using clamps

When using the internal reservoir only, the plumbing connections can be closed with the supplied plate and union nuts.

Tubing

Tubing for Thermo Scientific temperature control systems is optional.

CAUTION

Ensure the tubing you select meets your maximum temperature and pressure requirements. ▲

Plastic and rubber tubing

If other plastic and rubber tubes are used, ensure that the tubes selected are fully suitable for the particular application, i.e., that they will not split, crack or become disengaged from their connections.

Connect the tubing using the supplied tube fittings for 8 or 12 mm i.d. They are attached to the plumbing connections with a supplied coupling nut.

We highly recommend using foam rubber insulation on the tubing and the fittings.

Metal tubing

Thermo Scientific metal tubing (stainless steel insulated) offers a particularly high degree of safety and is suitable for both low and high temperatures/ liquids.

The metal tubing is attached directly to the plumbing connections, gaskets are not required.

CAUTION

Do not subject tubing to mechanical strain and ensure any specified bend radius is not exceeded. ▲

Tubing is available in lengths of 0.5, 1.0 and 1.5 meters. Couplings for connecting tubes are also available.

The smallest opening inside the metal tubes is 10 mm. The metal tubing is provided with coupling nuts (M16 x 1, DIN 12 879, part 2) at either end.

Approved Fluids

DANGER

Only use the approved fluids listed below. ▲

All immersion circulators:

Water

Ethylene Glycol-Water

Propylene Glycol-Water

SC 150 and SC 150L immersion circulators only:

SIL 100

SIL 180

SIL 300

SYNTH 60

SYNTH 260

Thermo Fisher Scientific takes no responsibility for damages caused by the selection of an unapproved fluid.

CAUTION

Other than water, handle and dispose of approved fluids in accordance with the fluid manufacturer's specification and/or the fluid's MSDS. ▲

CAUTION

To set the fluid temperature alarms, use the circulator's menu selection to identify the fluid, see Section 4. ▲

CAUTION

When using water above 80°C closely monitor the fluid level, frequent top-offs will be required. It will also create steam. ▲

CAUTION

Water/glycol mixtures require top-offs with pure water, otherwise the percentage of glycol will increase resulting in high viscosity and poor performance. ▲

Fire point
Flammable thermal liquids can ignite when a specified temperature is surpassed. The liquid is limited to a temperature level 25°C below the fire point as defined by the EN 61010.

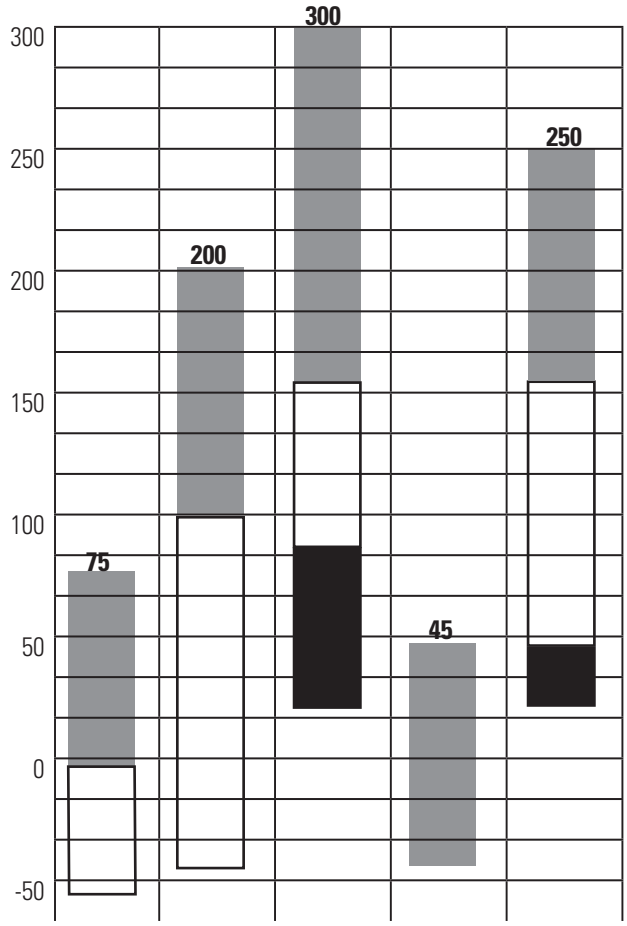
Viscosity
For optimum temperature accuracy, it is important that heat transfer liquids have a low viscosity.

Working temperature range
This is the recommended long-term operating range. The maximum viscosity is approximately 5 mPas.

Operating temperature range
Long-term operation is recommended only under certain conditions. The viscosity may rise to a maximum of 30 mPas. The pump capacity will not match specifications.

Heating-up range
Long-term operation is not recommended, the pump motor's excess temperature protection may switch off the pump.

Range of Application	Sil 100	Sil 180	Sil 300	Synth 60	Synth 260
Fire Point °C	>100	>225	>325	70	275
Flash Point °C	57	170	300	59	260
Viscosity at 20°C (mPas)	3	11	200	2	140
Density at 20°C (kg/dm³)	0.89	0.93	1.08	0.76	1.03
Specific heat capacity (kJ/Kg*K)	1.67	1.51	1.56	2.10	2.00



Order Number 10 liter container	999-0202	999-0204	999-0206	999-0210	999-0214
Order Number 5 liter container	999-0201	999-0203	999-0205	999-0209	999-0213
Color	trans-parent, colorless	trans-parent, colorless	trans-parent, colorless	trans-parent, colorless	trans-parent, yellow
Reacts with	Silicone	Silicone	Silicone	Rubber Silicone	Copper Light metals Bronze

EC-Safety Data Sheets will be delivered together with each container of liquid.

Chlorine
Short term usage of tap water may not cause any adverse affects on the circulator or your application, but in the long term problems may arise. To help alleviate these problems Thermo Fisher Scientific recommends the use of chlorine.

The duration of time that chlorine remains in solution depends on factors such as water temperature, pH and availability of direct sunlight. We recommend maintaining chlorine levels at proper levels using chlorine test strips, generally 1 to 5 ppm is adequate.

For best results, the pH of the fluid should be maintained between 6.5 and 7.5. Additional chlorine should not be added without first determining the concentration ratio that already exists in the fluid supply. Corrosion and degradation of the circulation components can result from concentration ratios that are too high. Contact our customer support for additional information.

5°C to 95°C — Distilled Water or Deionized Water (up to 3 MΩ-cm)
Normal tap water leads to calcareous deposits necessitating frequent circulator decalcification, see table page 3-14.

Calcium tends to deposit itself on the heating element. The heating capacity is reduced and service life shortened.

-30°C to 80°C — Water with Glycol
Below 5°C water has to be mixed with a glycol. The amount of glycol added should cover a temperature range 5°C lower than the operating temperature of the particular application. This will prevent the water/glycol from gelling (freezing) near the evaporating coil.

Excess glycol deteriorates the temperature accuracy due to its high viscosity.

-40°C to 200°C — SIL180
SIL180 is suitable for covering nearly the entire range with just one liquid, especially when used with the refrigerated baths.

Unfortunately SIL180 has a wetting tendency necessitating the occasional cleaning of the reservoir cover.

other temperatures:
Thermo Fisher Scientific offers a range of heat transfer fluids for these temperature control applications.

SYNTH 60 and SYNTH 260:
Synthetic thermal liquid with a medium life span (several months) and little smell annoyance.

SIL 100, SIL 180, SIL 300:
Silicone oil with a very long life span (over 1 year) and negligible smell.

Thermo Fisher heat transfer fluids are supplied with an EC Safety Data Sheet.

Ensure, when selecting the heat transfer fluid, that no toxic gases can be generated. Inflammable gases can build up over the fluid during usage. ▲

Ensure the over temperature cut-off point is set lower than the fire point for the heat transfer fluid selected. ▲

The highest working temperature, as defined by the EN 61010 (IEC 1010), must be limited to 25°C below the fire point of the fluid. ▲

Additional Fluid Precautions

When working with approved fluids other than water:

- Do not use any approved fluid until you have read and understood the label and the Material Safety Data Sheet (MSDS).
- Ensure any fluid residue or any other material is thoroughly removed before filling the reservoir with a different fluid.
- Always wear protective clothing, especially a face shield and gloves.
- Avoid spattering on any of the circulator's components, always *slowly* add fluid. When adding, point the opening of a container away from yourself.
- Use fume hoods.
- Do not allow any ignition sources in the vicinity.

Water Quality and Standards

Process Fluid	Permissible (PPM)	Desirable (PPM)
Microbiologicals		
(algae, bacteria, fungi)	0	0
Inorganic Chemicals		
Calcium	<25	<0.6
Chloride	<25	<10
Copper	<1.3	<1.0
	0.020 ppm if fluid in contact with aluminum	
Iron	<0.3	<0.1
Lead	<0.015	0
Magnesium	<12	<0.1
Manganese	<0.05	<0.03
Nitrates\Nitrites	<10 as N	0
Potassium	<20	<0.3
Silicate	<25	<1.0
Sodium	<20	<0.3
Sulfate	<25	<1
Hardness	<17	<0.05
Total Dissolved Solids	<50	<10
Other Parameters		
pH	6.5-8.5	7-8
Resistivity	0.01*	0.05-0.1*

* MΩ-cm (compensated to 25°C)

Unfavorably high total ionized solids (TIS) can accelerate the rate of galvanic corrosion. These contaminants can function as electrolytes which increase the potential for galvanic cell corrosion and lead to localized corrosion such as pitting. Eventually, the pitting becomes so extensive that refrigerant will leak into the reservoir.

As an example, raw water in the United States averages 171 ppm (of NaCl). The recommended level for use in a water system is between 0.5 to 5.0 ppm (of NaCl).

Recommendation: Initially fill the reservoir with distilled or deionized water. Do not use untreated tap water as the total ionized solids level may be too high. This reduces the electrolytic potential of the water and prevent or reduce the galvanic corrosion observed.

Filling Requirements

Ensure the reservoir drain port on the front of the bath is *closed* and that all plumbing connections are secure. Also ensure any residue is thoroughly removed before filling the reservoir.

⚠ CAUTION

Before using any fluid refer to the manufacturer's MSDS and EC safety data sheets for handling precautions. ▲

To avoid spilling, place your containers into the reservoir before filling.

With a low level WARNING the circulator continues to run, with a FAULT the circulator shuts down the refrigeration, pump and heater, see Section 7. The low level warning is at approximately 43 mm (1 3/4") below the top, the low level fault is at approximately 57 mm (2 1/4").

Oil-based fluids expand when heated. Fill the reservoir only to the minimum level. Monitor the fluid level whenever heating the fluid. ▲

When pumping to an external system, keep extra fluid on hand to maintain the proper level in the circulating lines and the external system.

Draining

⚠ CAUTION

Before draining any fluid refer to the manufacturer's MSDS and EC safety data sheets for handling precautions. ▲

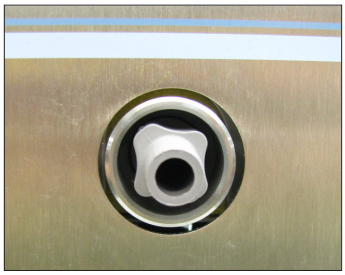
Ensure the fluid is at a safe handling temperature, ~55°C. Wear protective clothing and gloves. ▲

- place a suitable container underneath the drain. If desired, attach an 8 mm i.d. tube on the drain.
- *slowly* turn the drain plug until flow is observed.

⚠ CAUTION

Turning the drain cap more than 1 1/2 turns will result in the drain cap and fitting coming off the bath. ▲

In this case screw the drain fitting back into the bath. Attaching the cap onto the fitting aids in installation. If required, contact us for additional information.

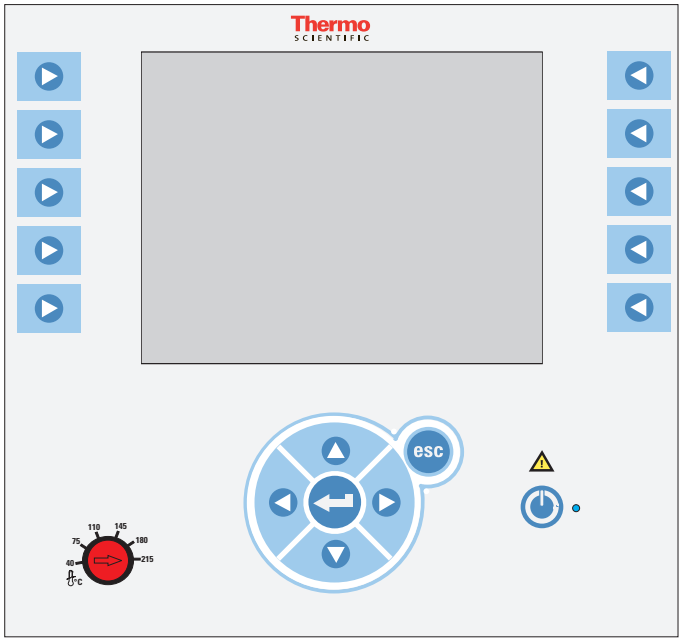


Installed Drain Fitting with Cap Removed

Section 4 Operation

PREMIUM Heated Immersion Circulator

The Thermo Scientific PREMIUM Heated Immersion Circulators have a digital display and easy-to-use touch pad, five programmable setpoint temperatures, acoustic and optical alarms and adjustable high temperature protection.



This label indicates read the instruction manual before starting the circulator.

Use this button to place the circulator in and out of stand by mode. The blue LED is on when stand by mode is enabled.

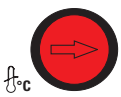
Use these arrows to move through the displays and adjust values.

Use these arrows to adjust values.

Pressing this button to save changes made on the circulator's displays.

Use this button to cancel any changes and to return the circulator to its previous display. Canceling a change can only be made before the change is saved. In some cases, it is also used to save changes.

Note Holding this button depressed for five seconds brings up the language selection display. ▲



Used for adjusting and resetting the High Temperature Cutout. Details are explained in this Section.

Setup

CAUTION

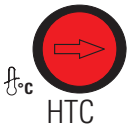
Leave refrigerated baths in an upright position at room temperature (~25°C) for 24 hours before starting. This will ensure the lubrication oil has drained back into the compressor. ▲

CAUTION

Before starting the circulator, double check all communication, electrical and plumbing connections. ▲

Initial Start Up

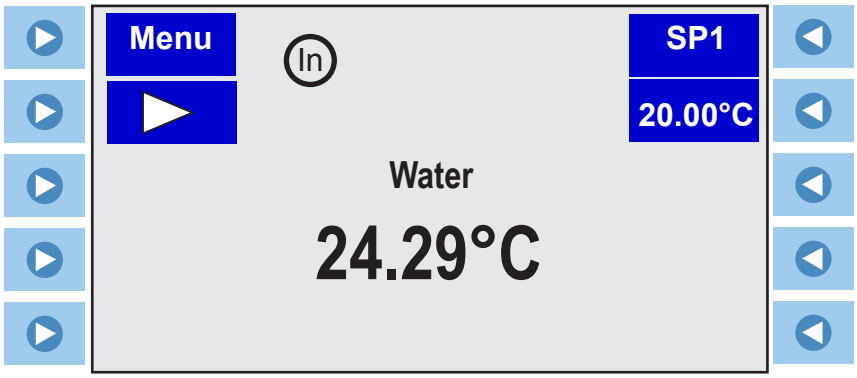
Using a flathead screwdriver, ensure the HTC is in the full clockwise position.



Do not run the circulator until fluid is added to the reservoir. Have extra fluid on hand. If it does not start refer to Section 6 Troubleshooting.

- For refrigerated baths, place the circuit protector located on the rear of the bath to the **I** position.

- For all circulators, place the circuit protector located on the rear of the immersion circulator to the **I** position. The blue LED illuminates.
- Press . The circulator momentarily displays **Thermo Scientific**.



Start Display

- And then the Start Display appears. The blue LED goes out.
- Press to the left of the start symbol, . The circulator starts and the start symbol turns into a stop symbol, .

Note After start up, check all the plumbing connections for leaks. ▲

The **Menu** and **SP1** portions on the top of the display are used to view and/or change the circulator's settings. The reservoir fluid is also displayed. These features are explained in detail later in this Section.

In indicates the circulator is using its internal sensor for temperature control. Ex is displayed when the external sensor is selected for temperature control.

Daily Start Up

⚠ CAUTION

Before starting the circulator, double check all communication, electrical and plumbing connections. ▲

The blue LED on the immersion circulator illuminates to indicate it is in stand by mode.

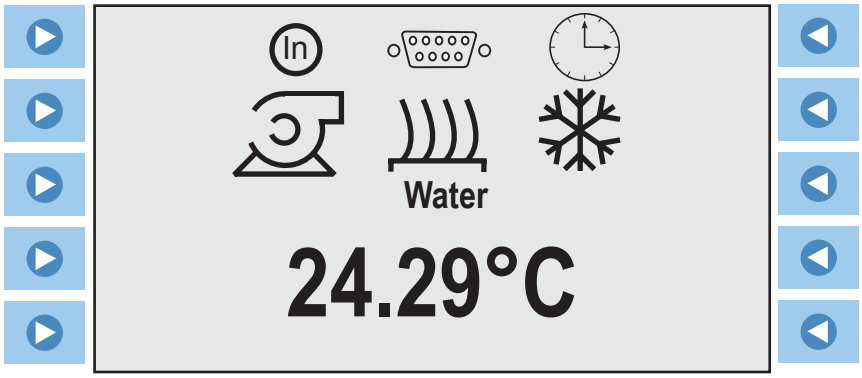
If so, press . The blue LED goes out. If Auto Restart is enabled the circulator starts. If Auto Restart is not enabled, or if the blue LED is not illuminated, use the **Initial Start Up** procedure described on the previous page.

The Auto Restart feature is described later in this Section.

Note When using oil as a reservoir fluid, we recommend running the circulator at 95°C for 15 minutes to remove any moisture in the fluid. ▲

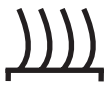
Status Display

If desired, press esc to toggle between the Start and Status Displays.



Status Display

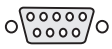
This icon is illuminated when the pump is running.



This icon is illuminated when the heater is on. The icon flashes when the reservoir fluid temperature is close to the desired setpoint.

This icon is illuminated when the refrigeration is on. The icon flashes when the circulator is in the energy saving mode, the mode is explained later in this section.

One of these icons is on to indicate which sensor is selected for temperature control, internal or external.



This icon is illuminated when the serial communications or analog option is enabled.

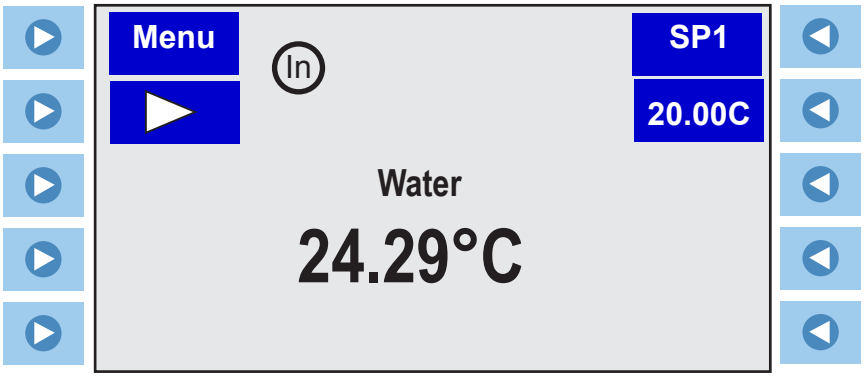
The icon is illuminated when both the circulator and timer are running. The icon flashes when the timer is enabled but not running.

Note If no operator inputs are being made, the circulator automatically switches to the Status Display after 60 seconds. If desired, change the time or disable this feature using the **Display Options** Menu. ▲

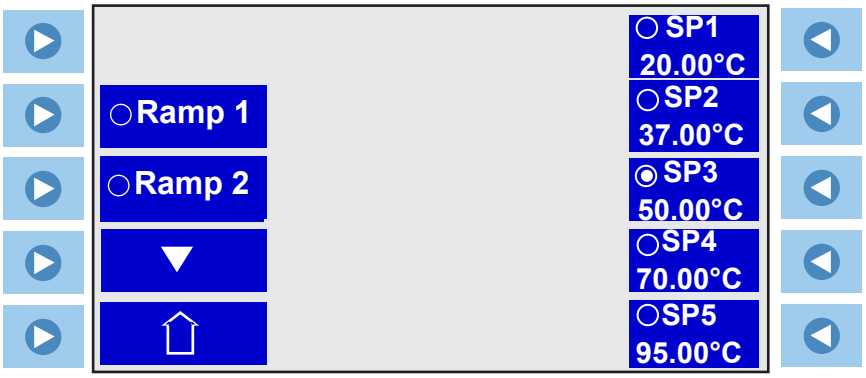
Changing the Setpoint

The Setpoint is the desired fluid temperature. The circulator can store up to five setpoints, **SP1** through **SP5**. The procedure for changing the stored setpoint values is discussed later in this Section.

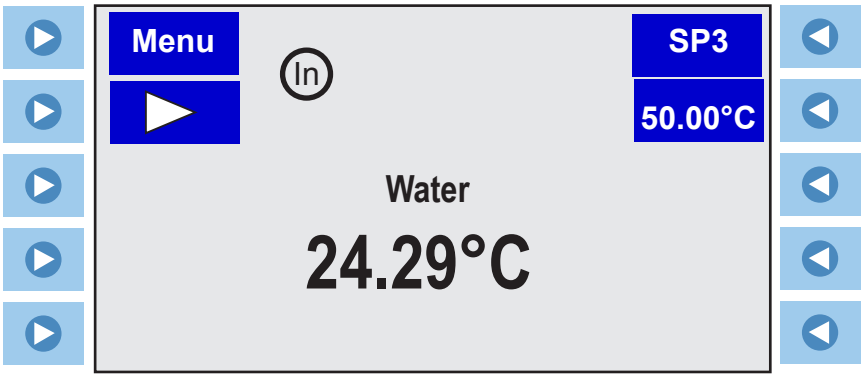
• On the Start Display press ◀ to the right of **SP1**.



The following display appears:



• Press ◀ to the right of the desired setpoint (in this example **SP3**) and then press esc, or ▶ to the left of the home symbol ⌂, to return to the Start Display.



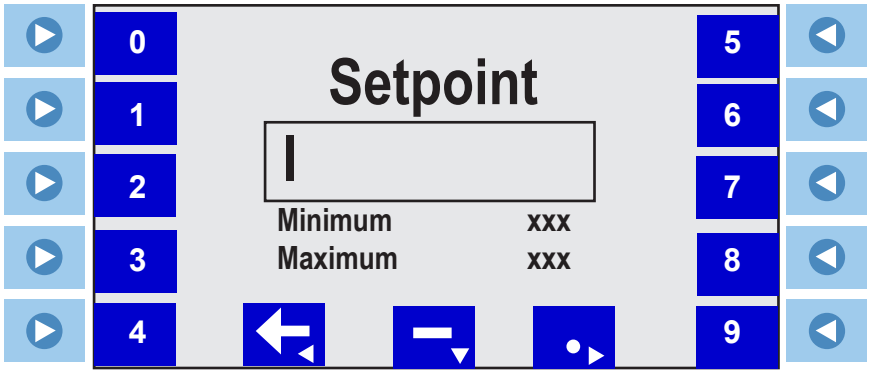
Change a Value Display

This display automatically appears when you request a change in value.

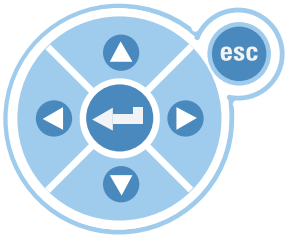
Note The circulator does not need to be running to change a value. ▲

• A cursor appears on the left side of the entry window as shown below.

• Press or to enter the corresponding digit. Use the arrow keys on the circular keypad to move the cursor back to the left , enter a negative value of insert a decimal point .



Change a Value Display



• Press when the desired value is displayed.

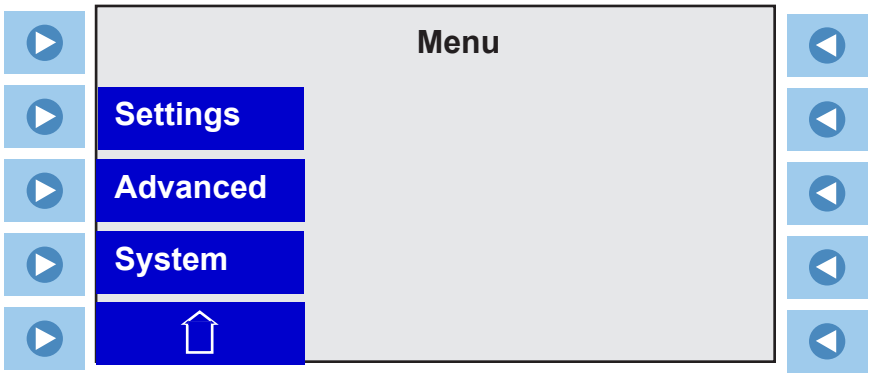
Note The circulator beeps if you try to enter a value outside the minimum or maximum value or by trying to enter more than one negative dash or decimal point. ▲

Menu Displays

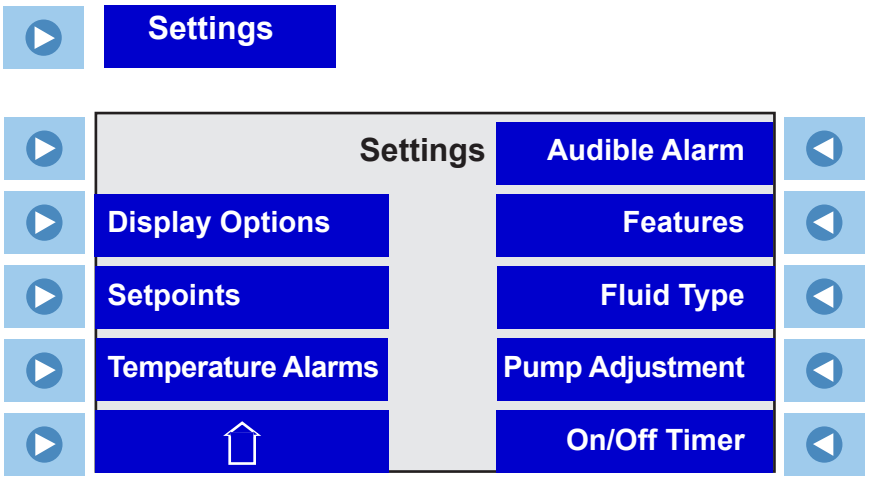
The circulator uses menus to view/change its settings.

Note Unless noted, the circulator does not need to be running to view/change settings. ▲

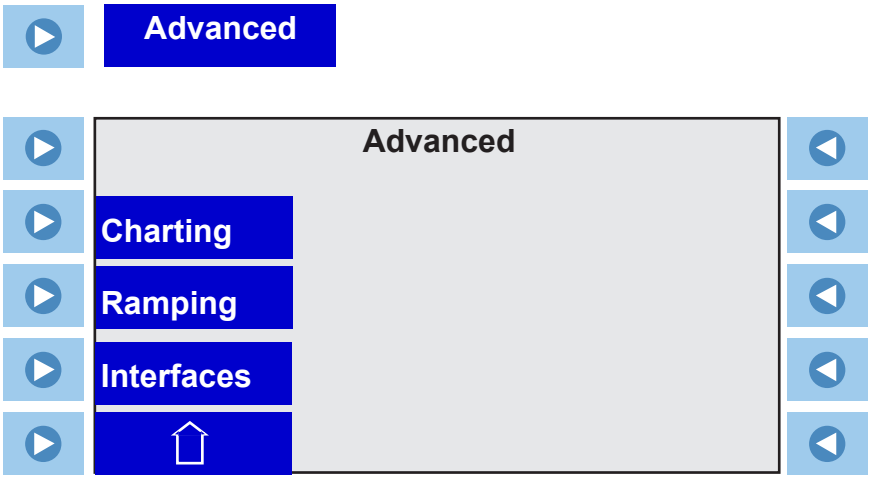
• Press to the left of **Menu** to bring up the Main Menu Display.



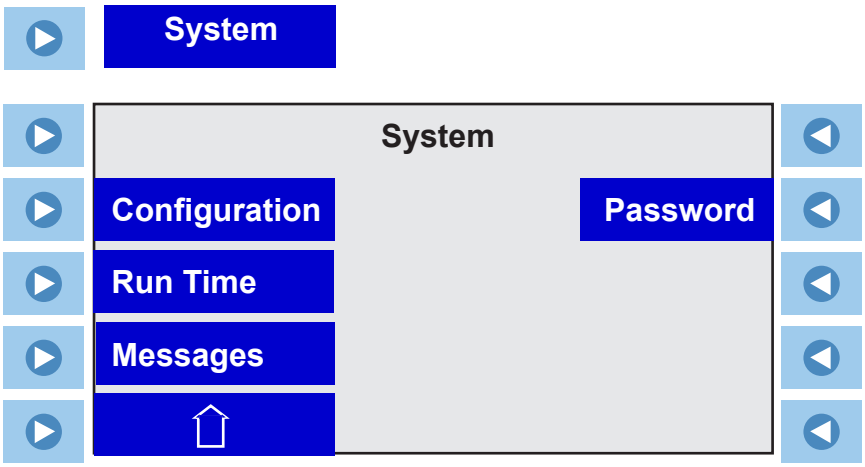
• Press to the left of the desired line to bring up submenus.



See page 4-10.

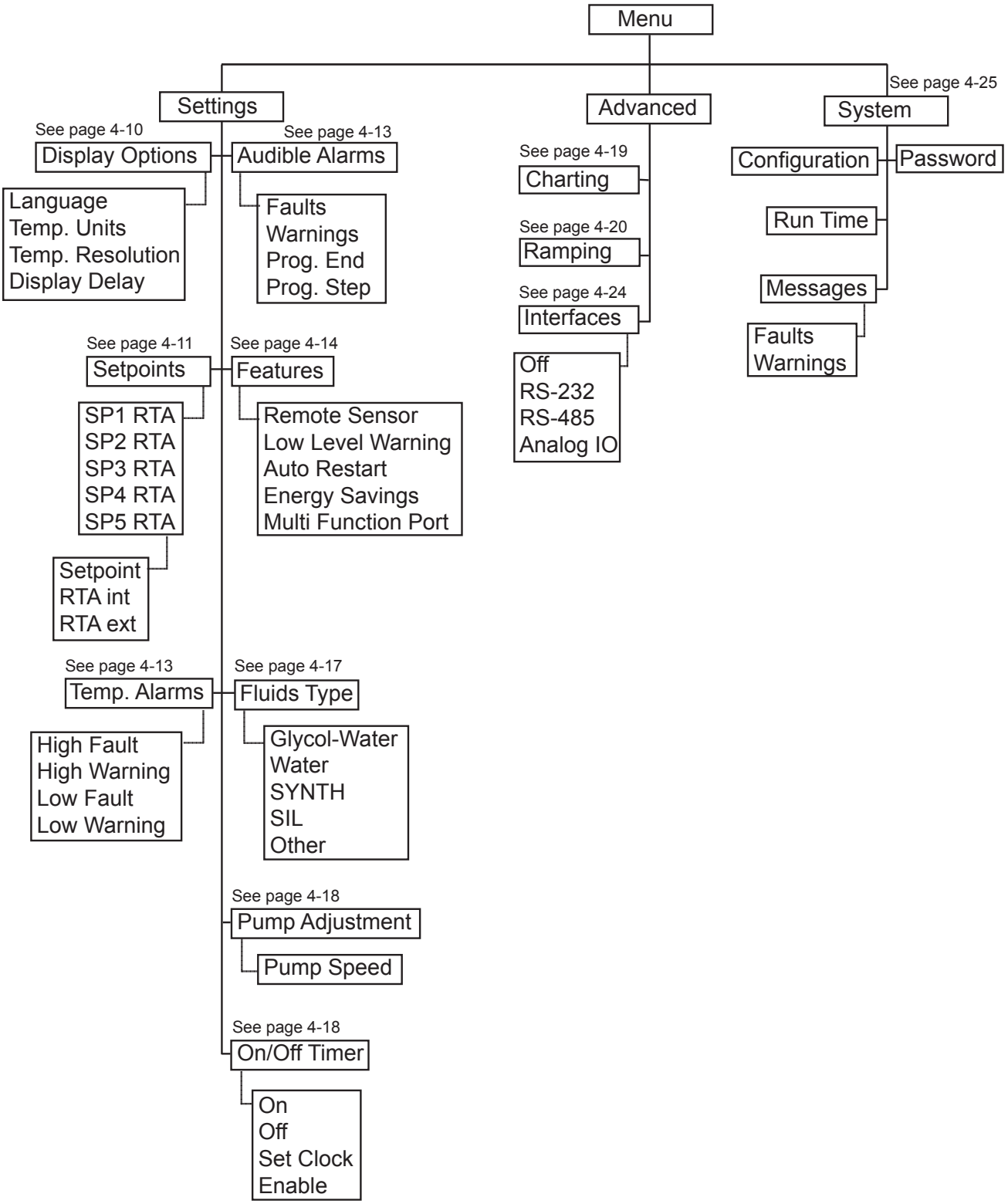


See page 4-18.



See page 4-23.

Menu Tree


Menu
Settings
Advanced
System
See page 4-25
See page 4-10
Display Options
See page 4-13
Audible Alarms
Language
Temp. Units
Temp. Resolution
Display Delay
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Prog. End
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Charting
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Interfaces
Off
RS-232
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Configuration
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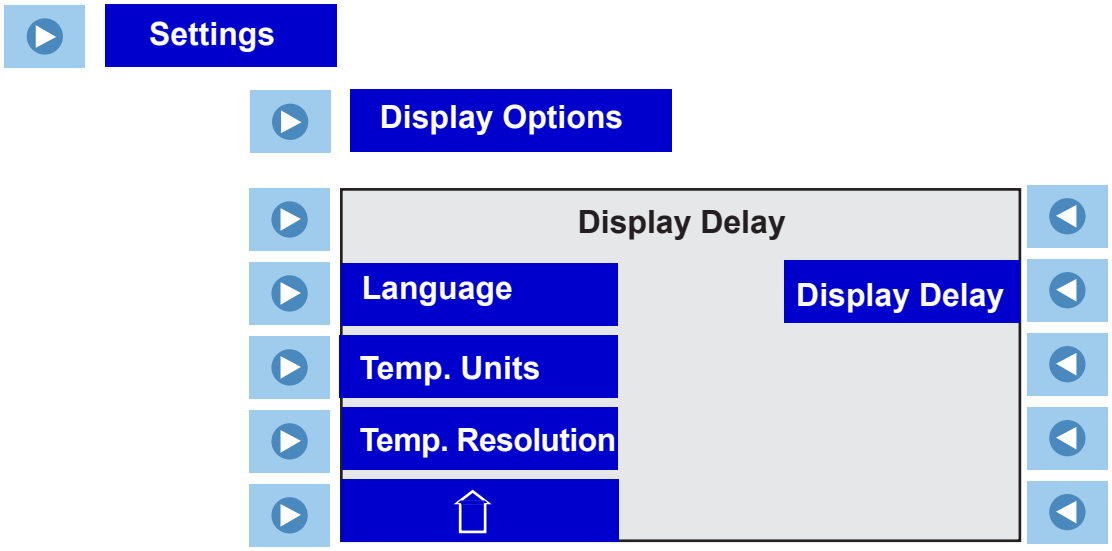
See page 4-11
Setpoints
See page 4-14
Features
SP1 RTA
SP2 RTA
SP3 RTA
SP4 RTA
SP5 RTA
Remote Sensor
Low Level Warning
Auto Restart
Energy Savings
Multi Function Port
Setpoint
RTA int
RTA ext
See page 4-13
Temp. Alarms
See page 4-17
Fluids Type
High Fault
High Warning
Low Fault
Low Warning
Glycol-Water
Water
SYNTH
SIL
Other
See page 4-18
Pump Adjustment
Pump Speed
See page 4-18
On/Off Timer
On
Off
Set Clock
Enable

Settings - Display Options

Display Options is used to view/adjust the circulator's temperature scale, select the temperature resolution and set the display delay.

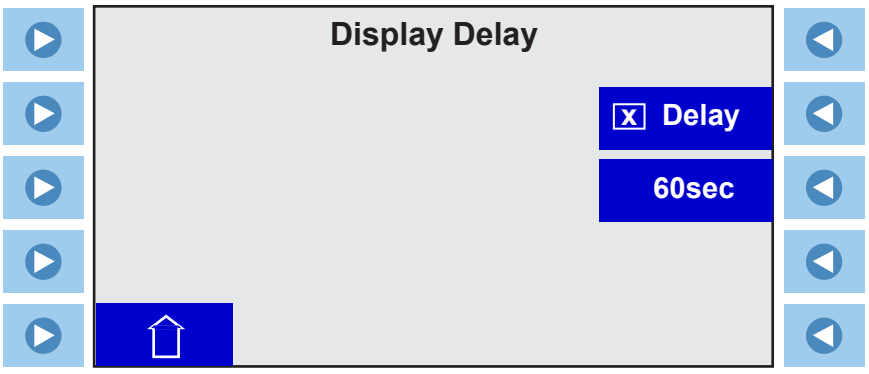


Language is used to select which language is displayed, English, German, French, Spanish, Italian, Chinese and Japanese.

Temp. Units is used to select the displayed temperature scale, **°C**, **°F** or **K**.

Temp. Resolution is used to select the displayed temperature resolution, **0.01** or **0.1** degree.

Display Delay is used to enable/disable and to select the Start Display display delay. The delay range is **5** to **900** seconds. If no arrows are pressed, the Start Display changes to the Status Display after the delay expires, see pages 4-2 and 4-4.



Press next to the **Delay** to bring up the Change a Value Display.

Settings - Setpoints

Setpoints is used to view/adjust the circulator's five Setpoints (**SP**)and Real Temperature Adjustments (**RTA**). The display shows the temperature measured by the internal or external sensor, if this temperature does not accurately reflect the actual temperature in the reservoir an RTA is required. The RTA can be set ±10°C (±18°F).

As an example, if the temperature is stabilized and displaying 20°C but a calibrated reference thermometer reads 20.5°C, set the RTA to -0.5°C. After you enter a RTA value allow display to stabilize before verifying the temperature in the bath. **Note** If display accuracy is required, we recommend repeating this procedure at various setpoint temperatures and on a regular basis. ▲

Note For refrigerated baths, the setpoint limits are determined by the combination of the circulator, bath and fluid. The highest setpoint is the lesser of the highest limit of the three while the lowest setpoint is the greater of the lowest limit of the three. For heated baths, only the circulator and fluid are used. ▲

Circulator Limits °C:

	Min	Max
PC 200	-90	200
PC 201	-90	200
PC 300	-50	300

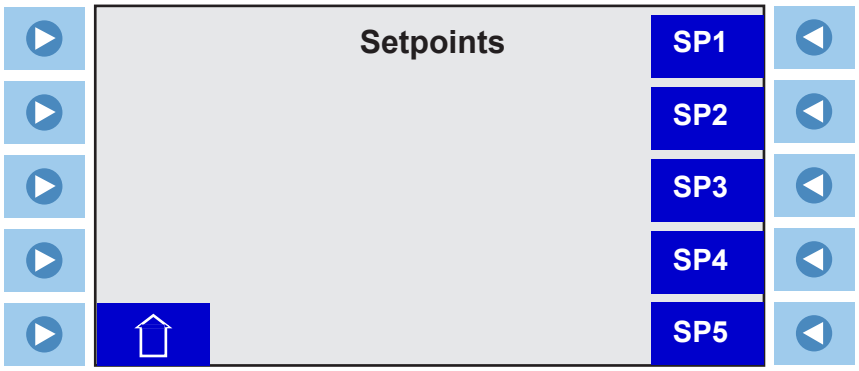
Fluid Limits °C:

	Min	Max
SYNTH 60	-50	45
SYNTH 260	45	250
SIL 100	-75	75
SIL 180	-40	200
SIL 200	20	200
SIL 300	80	300
Water	5	95
EG/Water	-30	100
Other	-90	300

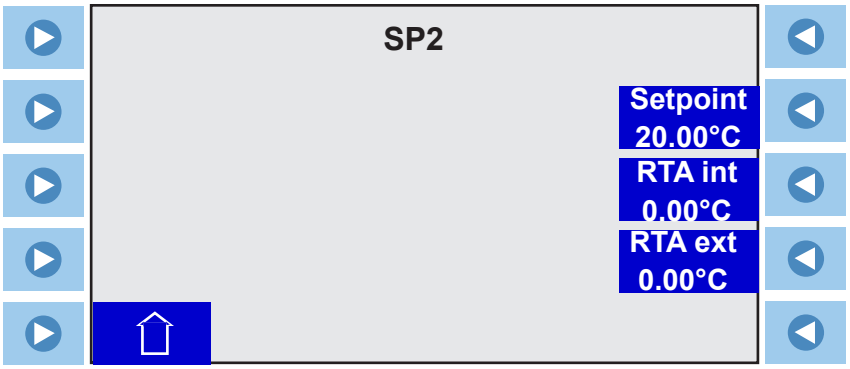
Bath Limits °C:

	Min	Max
A28	-28	200
A25	-25	200
A40	-40	200
A28F	-28	200
A24B	-24	200
G50	-50	200

When selecting a different fluid, the limits shrink if they are outside of the new system limits. However, they do not expand if they are well within the system limits.



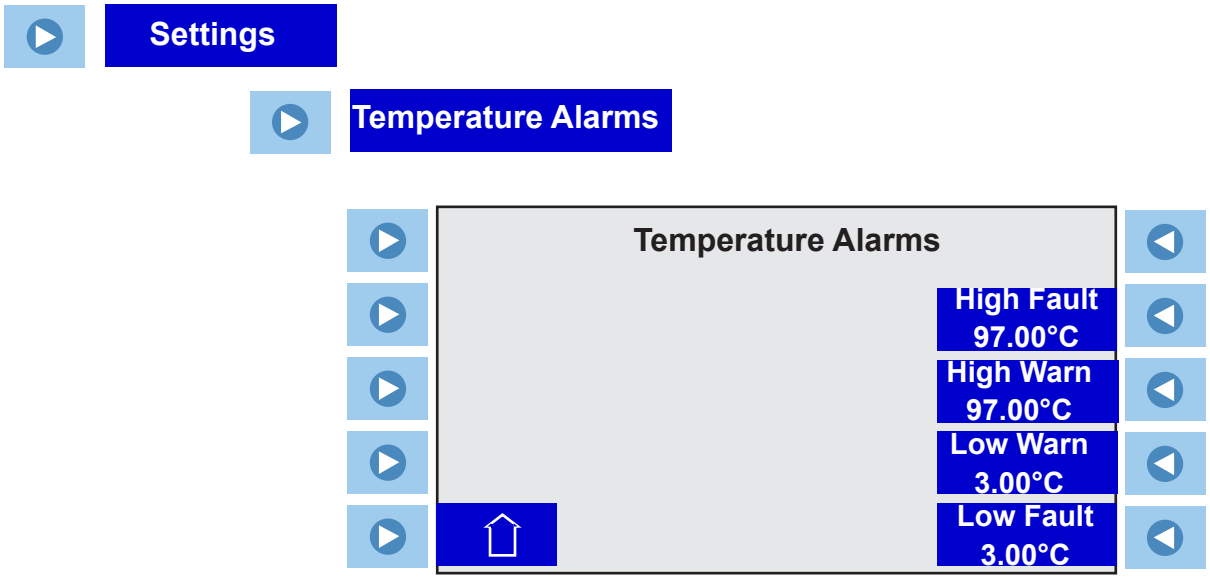
Press next to the desired setpoint to bring up:



Press next to the desired setting to bring up the Change a Value Display to make changes.

Settings - Temperature Alarms

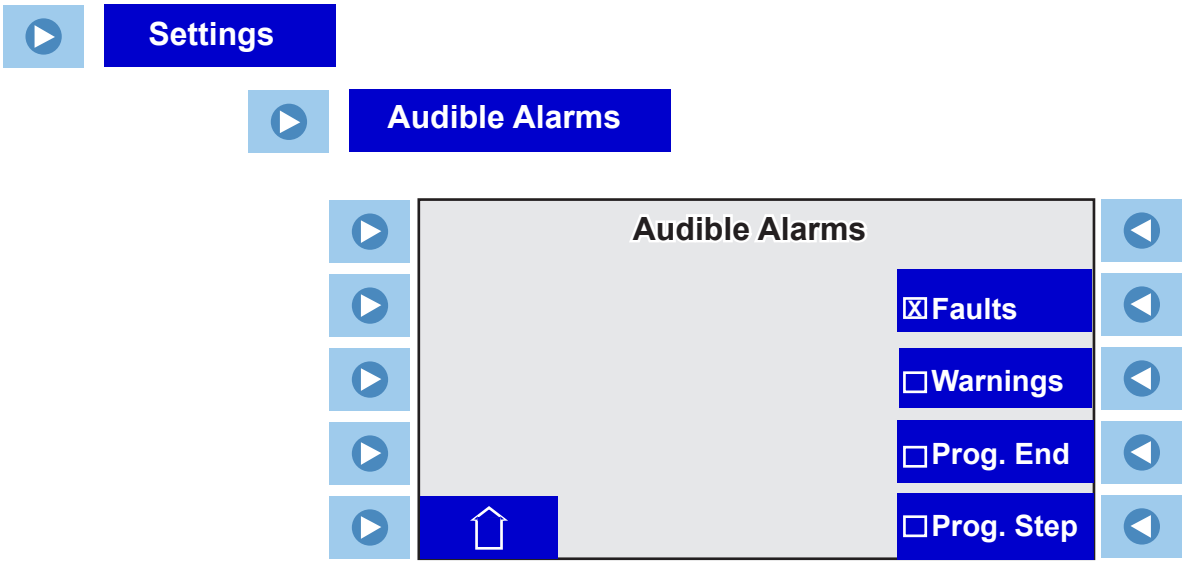
Temperature Alarms is used to view/adjust the temperature warning and fault limits. If a limit is exceeded the alarm sounds, if enabled. In the case of a fault the circulator also shuts down. **Note** The alarm range limits depend on the fluid, circulator and bath used. ▲



Press ◀ next to the desired fault/warning to make changes .

Settings - Audible Alarms

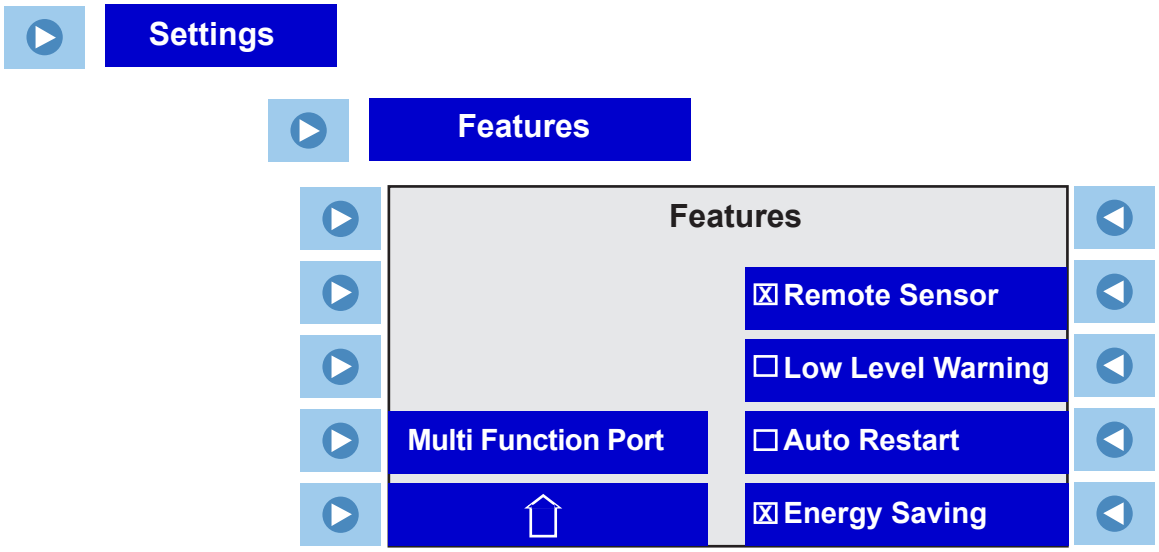
Audible Alarms is used to enable/disable the audible alarms.



Press ◀ to enable/disable the desired alarm(s).

Settings - Features

Features is used to enable/disable immersion circulator features.



Press ◀ next to the desired feature to enable/disable.

The **Remote Sensor** connector on the rear of the immersion circulator requires a 4-pin connector that must mate to a LEMO # ECP.1S.304.CLL. The immersion circulator uses a 3 wire sensor, but a 4 wire sensor can be used (pins 3 and 4 are interconnected in the control head). The pin-out is:

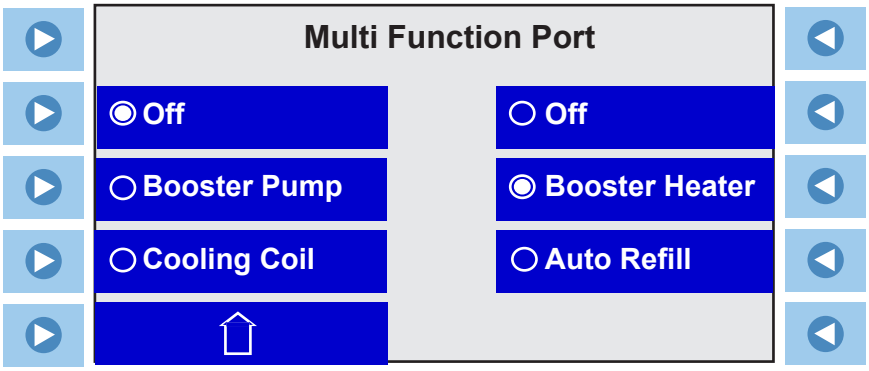
Pin 1 and 2 = Pt100 + Pin 3 and 4 = Pt100 -

When **Low Level Warning** is enabled, the circulator sounds an alarm if a low level condition occurs.

When **Auto Restart** is enabled, the circulator automatically restarts, if it was running, after a power interruption condition. If a ramp was running when power failed, the ramp program resumes where it left off. **NOTE** Consider any possible risks before enabling this mode of operation. ▲

The **Energy Saving** mode is primarily designed for applications running under a stable load. Enabling the mode saves energy by reducing the circulator's heater power and cooling requirements. This can result in substantial energy savings over the life of the circulator. The default setting is disable (enable for A40 refrigerated circulators).

The refrigeration icon ❄ blinks when the **Energy Saving** mode is enabled.

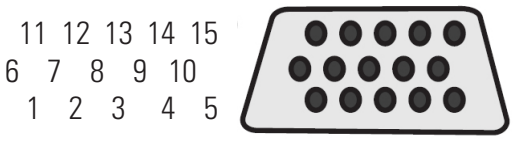


Booster Pump (pins 4 and 14) is on whenever the option is enabled.

Boost Heater (pins 5 and 10) is on when enabled and the setpoint is >2°C above the bath temperature. The boost heater is normally off when the bath temperature is within 2°C of setpoint.

Cooling Coil (pins 4 and 14) is on when the bath temperature is >2°C above setpoint or when the heater power drops to 0%, it's off when the heater power exceeds 80%. This feature is used in conjunction with an *optional* accessory box to select and activate additional features. The accessory box connects to the multifunction port.

Auto Refill (pins 5 and 10) is on when the fluid level drops below 47 mm (~1 7/8") from the top and is off when the fluid level is at 27 mm (~1") from the top. This feature is used in conjunction with an *optional* accessory box to select and activate additional features. The accessory box connects to the multifunction port.



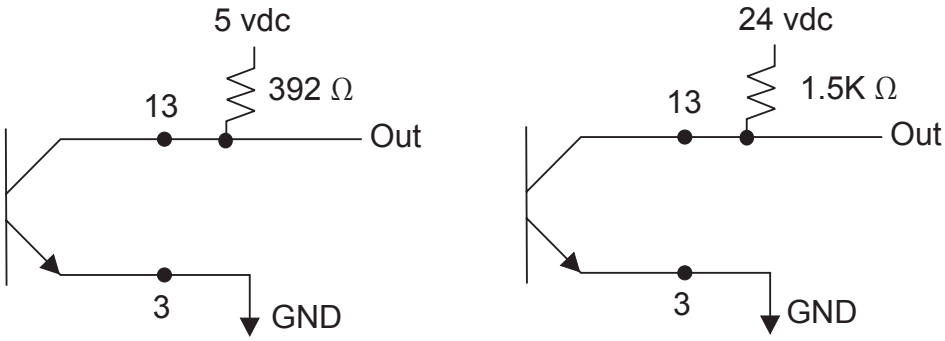
Multifunction Port Pin Out

See next page for additional information.

MultiFunction Port Standard I/O DB-15HD

Alarm Output Pins 13(+) and 3 (-) Open Collector Output

This output turns on (conducts) when there is an alarm. Any alarm that turns off the circulator will also set this output. An alarm message is displayed. (Maximum current on the output cannot exceed 25mA and 24 VDC.) A resistor must be supplied to limit the current, see samples below.



External Alarm Input Pins 12(+) and 2 (-)

To enable this input, apply 10 - 20 mA to pins 12 and 2. This input turns off the circulator. The alarm continues to sound until the input is removed. See samples below.

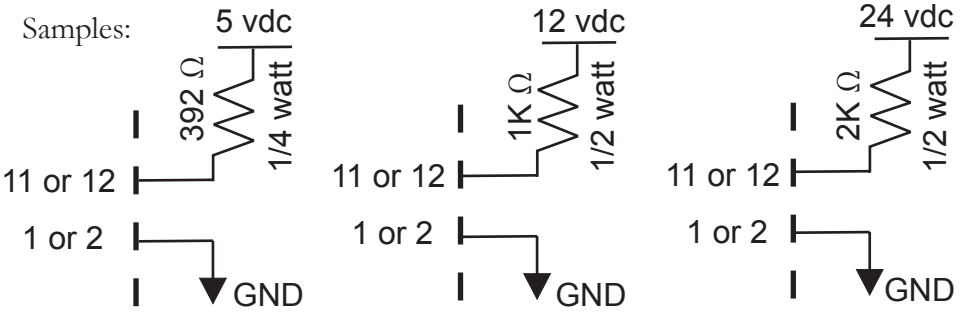
External Alarm
please remove reason and press ENTER to clear message

External On/Off Input Pins 11(+) and 1 (-)

To enable this input, apply customer supplied 10 - 20 mA to bath pins 11 and 1. This input turns the circulator on and off. A message is displayed when the input turns off. The circulator logic is reversed for this input: conducting = circulator off, not conducting = circulator on. See samples below.

External Signal
Operation Stopped by external command

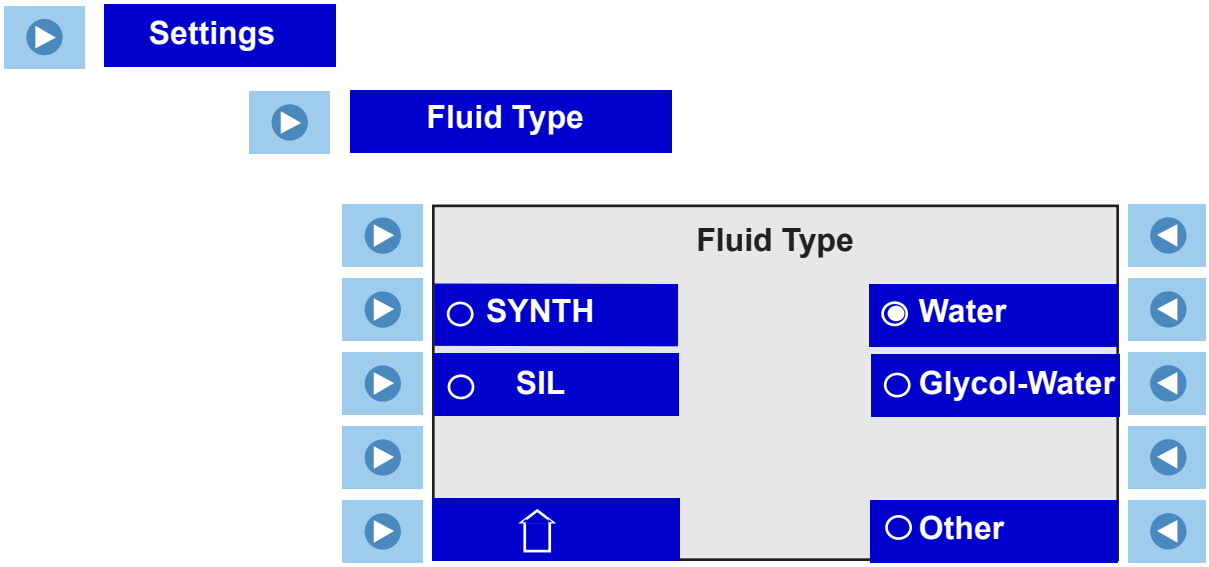
Samples:



ON STATE Current = 10 - 20 mA

Settings - Fluid Type

Fluids Type is used to identify the type of fluid used. The circulator uses the fluid type to automatically set certain operating parameters.



Press ▶ or ◀ next to the desired fluid or fluid type.

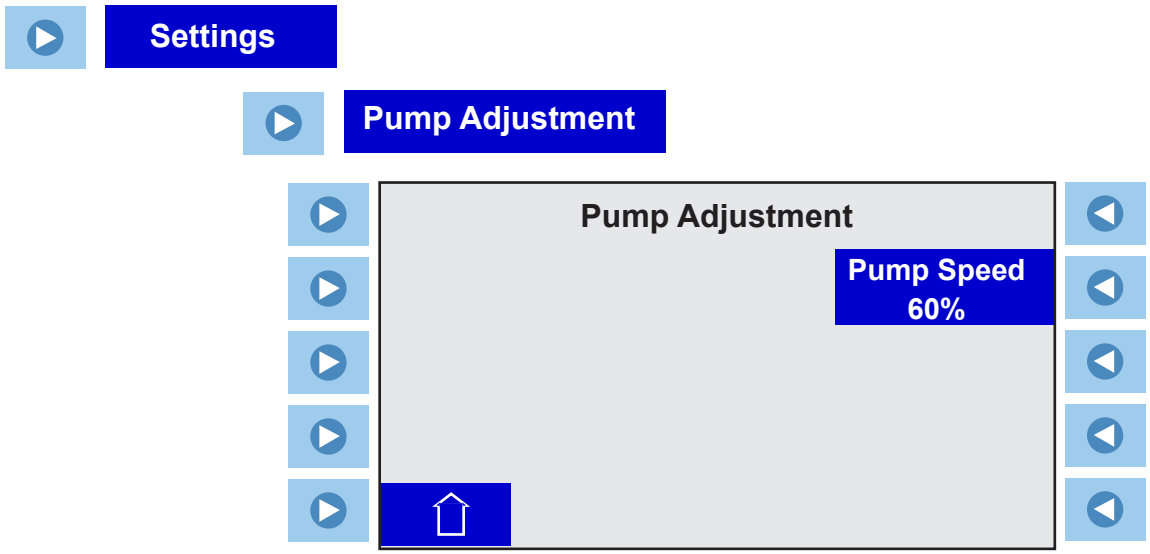
Note For high viscosity fluids with a wide "Heating-up range" (e.g., SIL300 - see Section 3), the circulator automatically slows the heating from ambient to the "Operating temperature range" to help prevent fluid degradation that is caused by rapid heating while still at high viscosities. ▲

Fluid Limits °C:

	Min	Max
SYNTH 60	-50	45
SYNTH 260	45	250
SIL 100	-75	75
SIL 180	-40	200
SIL 200	20	200
SIL 300	80	300
Water	5	95
EG/Water	-30	100
Other	-90	300

Settings - Pump Adjustment

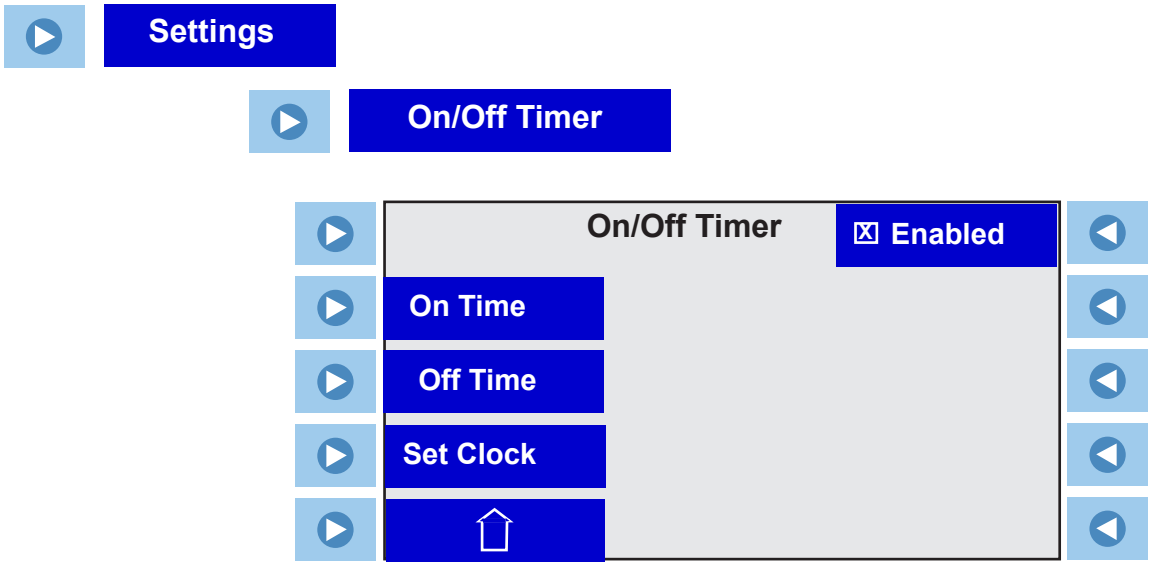
Pump Adjustment is used to set the pump speed.



Press next to **Pump Speed** to bring up the Change a Value Display to make changes. **Note** The minimum pump speed is 40%. ▲

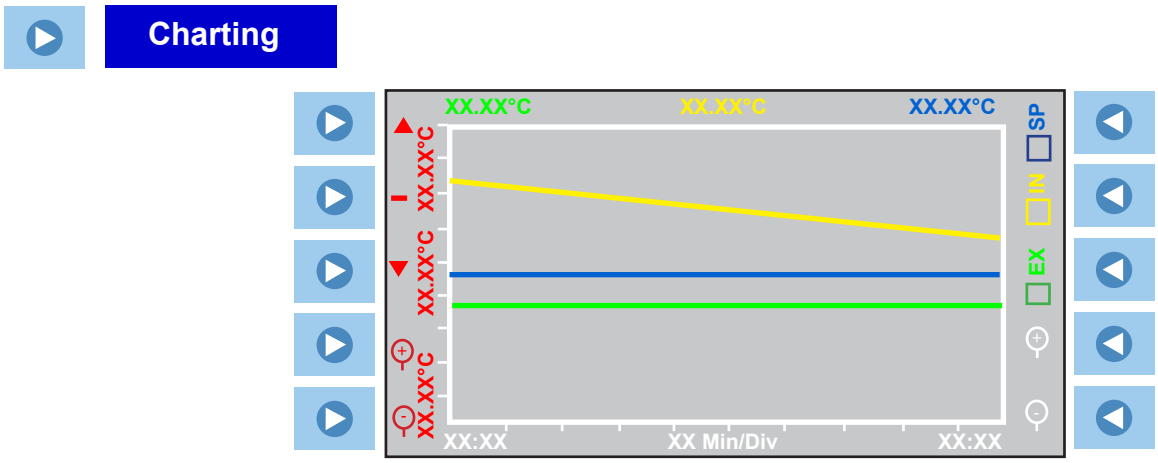
Settings - On/Off Timer

On/Off Timer is used to set/verify the timer date and time as well as its on/off settings. It is also used to enable/disable the timer.



Advanced - Charting

Charting is used to view a graphical display of your program.



Enable the green box to display the external temperature sensor chart. The current external temperature sensor is also displayed in the upper left hand corner of the display.

Enable the yellow box to display the internal temperature sensor chart. The current internal temperature sensor is also displayed in the upper middle of the display.

Enable the blue box to display the setpoint chart. The current setpoint is also displayed in the upper right hand corner of the display.

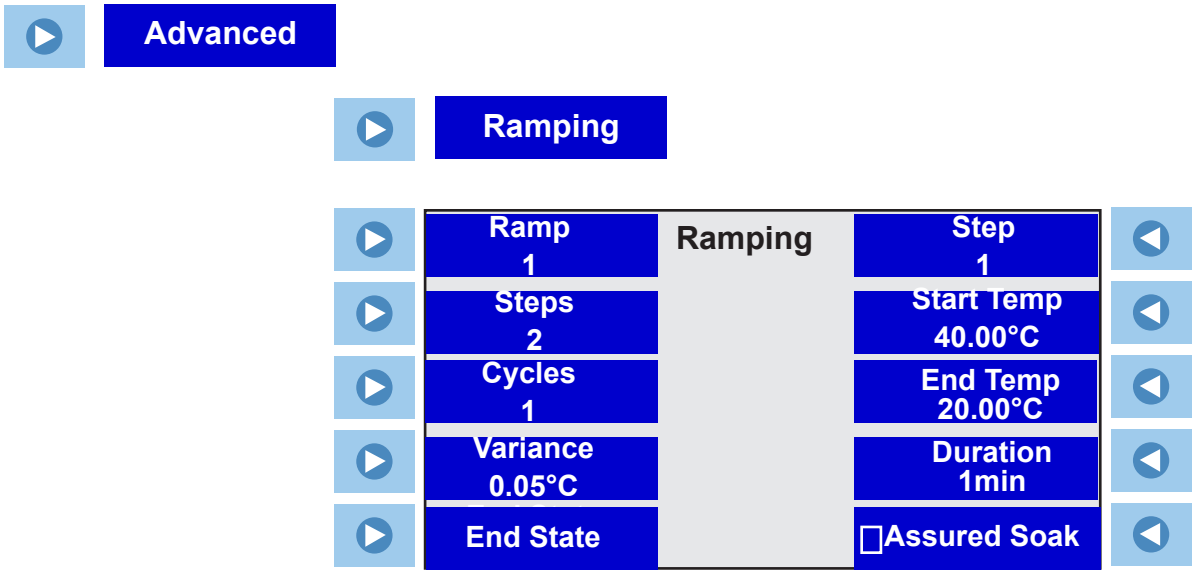
The white horizontal axis on the bottom of the display represents time. The right end of the display always shows the current time. Use the white zoom tools to change the displayed time increments. There are eight incremental ranges available, from one minute to two hours. Units are minutes/division or hours/division.

The red vertical axis on the left hand side of the display represents temperature. The temperature scale depends on the units selected in **Menu - Display Options - Temp. Units**. Use the red zoom tools to change the displayed temperature increments. There are 12 incremental ranges available, from 0.1 of a degree to 500 degrees.

The red dash is used to horizontally center the setpoint chart on the display. If desired, use the triangles to move the desired setpoint chart up or down the display. Use the red dash again to center it.

Advanced - Ramping

Ramping is used to build/edit a ramp program.



Define your program as a series of setpoints with a known period of time interval between each. Each interval is one step of the program. Pay careful attention to the first part of your program. What conditions must exist at the beginning of your process? For example, at the starting setpoint you may need to program an initial period of constant temperature to allow for thermal stabilization.

Note Consider the circulator's limitations when designing programs. Temperature or time parameters which exceed the performance capabilities of the circulator will result in unsatisfactory operation. If reaching the ramp setpoint temperatures is important, you will have to operate the bath between the desired setpoints and note the duration before programming the ramp. ▲

It is possible to create a program calling for very rapid changes in temperature. Although the circulator may not be capable of producing such changes, it may be practical to program such steps as a way to cause the fastest possible temperature change.

There can be up to 10 **Ramps**, each with up to 30 **Steps**. Each **Ramp** can be **Cycled** up to 100 times.

Cycles sets the number of times the entire ramp program is repeated after the last step is completed. For example, selecting 3 **Cycles** runs the entire ramp program a total of 3 times.

The **Variance** is used to set a temperature range, the program will not start until the fluid temperature is within this range. For example, if the desired **Start Temp** is 25°C and the **Variance** is set to +5°C, the program automatically starts only when the fluid temperature is between 20°C to 30°C.

Note The **Start Temp** for a step 2 is the **End Temp** from step 1, and so on.

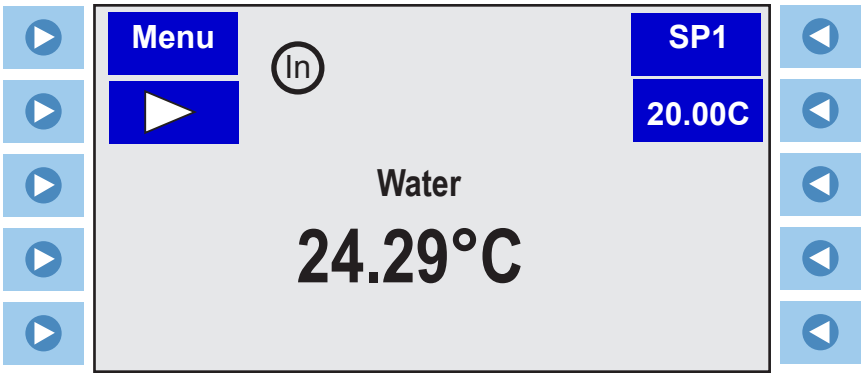
The maximum **Duration** for a step is 1000 minutes.

End State configures the circulator to either **Shut Down** or continue running (**Maintain**) when the program is over.

The ramp program has an optional **Assured Soak** feature that can be enabled for each step independently. When enabled this feature pauses the ramp timer while the temperature reaches setpoint, ± variance.
This assures the temperature reaches setpoint before the ramp program continues to the next step.

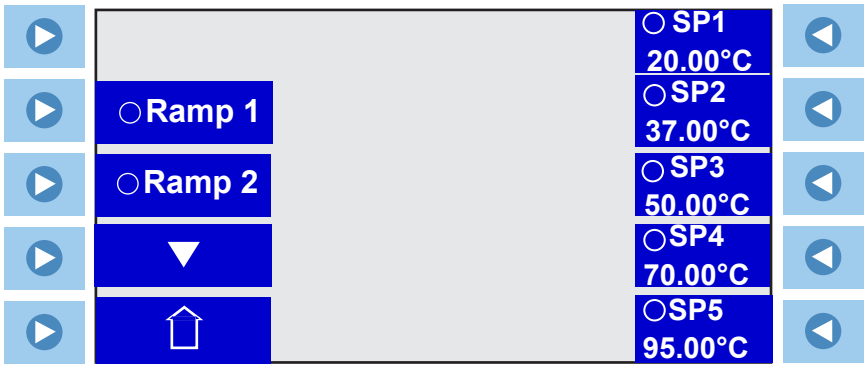
Running a Ramp Program

You can enable an alarm to sound when each step and/or the program is complete, see **Settings - Audible Alarms** in this section.

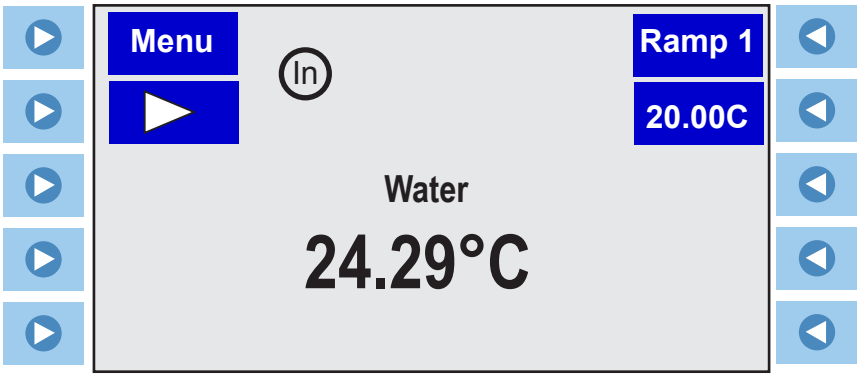


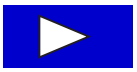
• Press to the right of SP1.

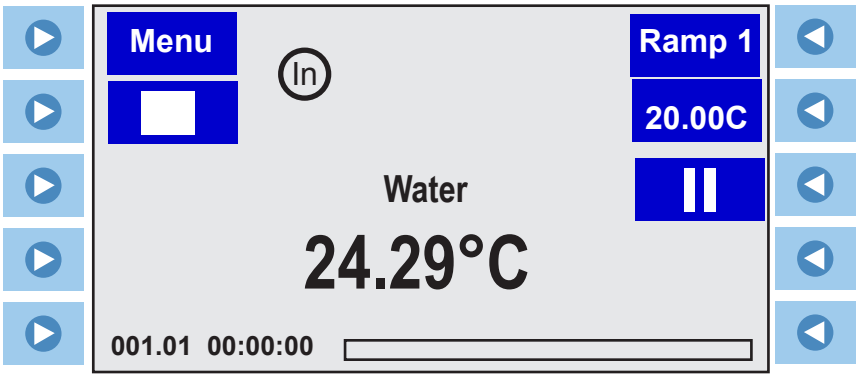
The following display appears:



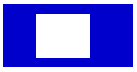
• Select the desired ramp and then press esc, or to the left of the home symbol , to return to the Start Display.



• Press to the left of  to start the program. The display changes to the Program Display



The program does not start until the process fluid temperature is at the **Start Temp** ± the **Variance**.

• Press to the left of  to stop the program or to the right of to pause the program at the current temperature.

When the program is complete the circulator maintains the last setpoint.

When is pressed after the ramp program is complete the refrigeration, pump and circulator shut off.

Note Other than the current ramp step, you can edit any other step of the ramp during the run or in the pause mode. ▲

The numbers at the bottom indicates the cycle number, step number and total time remaining for the program (hours, minutes and seconds).
Note If assured soak is enabled the time stops counting down at the end of the step until the desired temperature ± variance is reached. ▲

When the program is complete the alarm, if enabled, sounds.

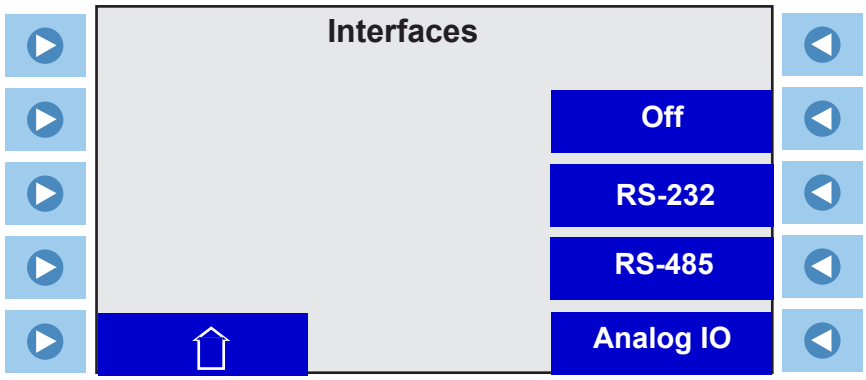
Note If you do not stop/end the ramp program before going back to the setpoint (**SP**) mode, changing the setpoint has no affect. For example on a program which ends with the bath at 25°C the bath continues to hold this setpoint. Changing from ramp mode to setpoint mode and then changing the setpoint to 20°C has no affect, the bath will continue to hold 25°C. ▲

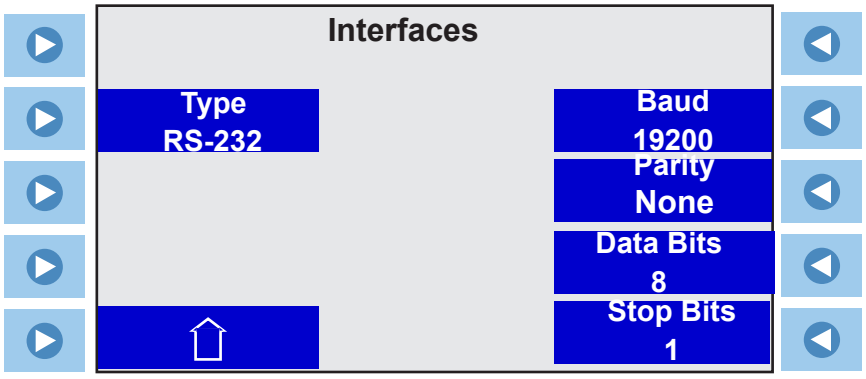
Advanced - Interfaces

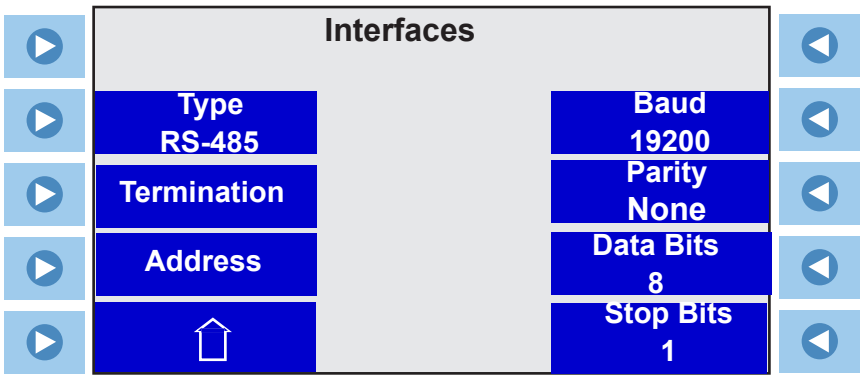
Interfaces is used to view/change communication and communication settings.

Note Keypad operation is still available with serial communications enabled. ▲

• Press on the right to select Off, RS-232 or RS-485, or Analog IO. See Appendix for additional information.

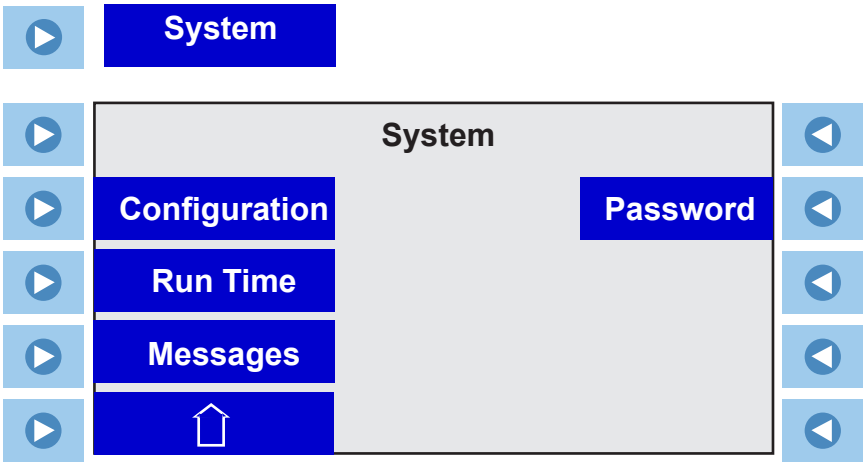






System - Configuration

Configuration is used to view the circulator's firmware version(s).



System - Run Time

Run Time is used to view the operating hours for the circulator and its components.

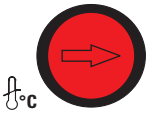
System - Messages

Messages is used to view and, if desired, delete any stored messages. The circulator can store and display up to the last 10 Warning and last 10 Fault messages. Messages can be then deleted individually or as a group.

System - Password

Password is used if the circulator needs a calibration or if the circulator PID values require changing. Changing the Password also allows you to restore the circulator to factory preset values. See Section 7.

High Temperature Cutout



HTC (Temperature range varies with type of immersion circulator.)

To protect your application, the adjustable High Temperature Cutout (HTC) ensures the heater does not exceed temperatures that can cause serious damage. A temperature sensor is located in the reservoir. A HTC fault occurs when the temperature of the sensor exceeds the set temperature limit.

In the event of a fault the circulator shuts down and displays a fault message, see Section 6. The cause of the fault must be identified and corrected before the circulator can be restarted. A low reservoir fluid level is a primary reason for the HTC to trip.

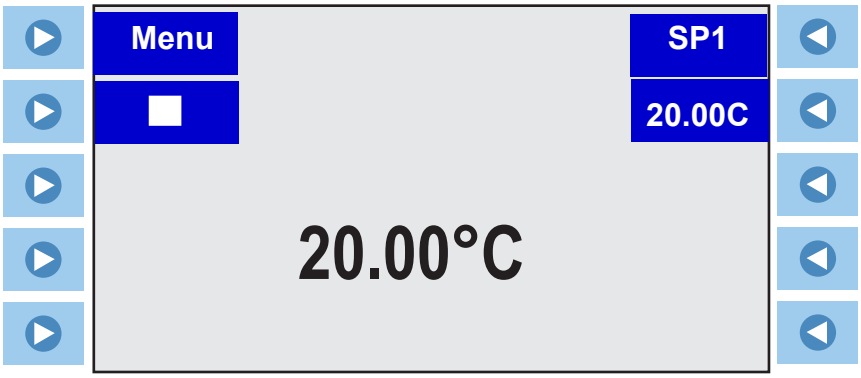
The HTC is factory preset fully clockwise to the highest possible setting. To set the cutout start the circulator and adjust the setpoint a few degrees higher than the highest desired fluid temperature. Allow the circulator to stabilize at the temperature setpoint. Then, using a flathead screwdriver, slowly turn the red dial counterclockwise until the circulator shuts down and the fault message appears. Press ↵ to clear the message.

Before you can restart the circulator it has to cool down a few degrees. To restart the circulator press the black reset ring surrounding the red dial - and then press ↵ again. If Auto Restart is enabled the circulator restarts, if disabled use the Start Up procedure.

Note: We recommend periodically rechecking operation or if the circulator is moved. ▲

Stopping the Circulator

• Press to the left of the stop symbol, . The circulator stops and the stop symbol turns into a start symbol, .



Power Down

• Press . The circulator's display goes blank and the blue LED illuminates indicating it is in the stand by mode.

Shut Down

• On refrigerated baths, place the circuit protector on the rear of the bath to the **O** position.

• Place the circuit protector on the rear of the immersion circulator to the **O** position. The blue LED extinguishes.

I
O

⚠ CAUTION

Using any other means to shut the circulator down can reduce the life of the compressor. ▲

⚠ CAUTION

Always turn the circulator off and disconnect it from its supply voltage before moving. ▲

⚠ CAUTION

The circuit protector(s) located on the rear of the component(s) is not intended to act as a disconnecting means. ▲

Restarting

Note When quickly restarting refrigerated baths, the compressor may take up to 10 minutes before it starts to operate. ▲

Decommissioning/ Disposal

Decommissioning prepares equipment for safe and secure transportation.

WARNING

Laboratory Grade Ethylene glycol (EG) is poisonous and flammable. Before disposing refer to the manufacturer's most current MSDS for handling precautions. ▲

CAUTION

Decommissioning must be performed only by qualified dealer using certified equipment. All prevailing regulations must be followed. ▲

Consider decommissioning the circulator when:

- It fails to maintain desired specifications
- It no longer meets safety standards
- It is beyond repair for its age and worth

Refrigerant (R134A) and oil (POE or Ester) must be recovered from equipment before disposal.

Note Keep in mind any impact your application may have had on the circulator. ▲

Direct questions about chiller decommissioning or disposal to our Sales, Service and Customer Support.

CAUTION

Handling and disposal should be done in accordance with the manufacturers specification and/or the MSDS for the material used. ▲

Storage

CAUTION

If the circulator is to be transported and/or stored in cold temperatures it needs to be drained and then flushed with a 50/50 laboratory grade glycol/water mixture. ▲

The circulator can be stored for up to 90 days inside the temperature range of -25°C to +60°C (-13°F to +140°F).

If necessary, when removing the circulator from storage allow it time to warm up and dry out in order to prevent any condensation issues.

Section 5 Preventive Maintenance

CAUTION

Disconnect the power cord prior to performing any maintenance. ▲

Handle the circulator with care. Sudden jolts or drops can damage its components. ▲

Cleaning

After time, the circulator's stainless steel surfaces may show spots and become tarnished. Clean the reservoir and built-in components at least every time the fluid is changed. Use only water and a soft cloth.

CAUTION

Do not use scouring powder. ▲

In order to ensure a long service life keep the reservoir clean. Quickly remove substances containing acidic or alkaline substances and metal shavings that could harm the surfaces causing corrosion. If corrosion (e.g., small rust marks) occurs in spite of this, cleaning with stainless steel caustic agents is suitable. Apply these substances according to the manufacturer's recommendations.

CAUTION

When cleaning the reservoir do not use any substances which contain solvents. ▲

Condenser Fins

For refrigerated baths, in order to maintain the cooling capacity clean the fins two to four times per year, depending on the operating environment.

Switch off the circulator and unplug the power cord.

For ARCTIC A40
1 Remove the condenser panel.

2 Clean fins with brush or similar tool.

3 Replace the panel.

For all other refrigerated baths:
Clean the fins with compressed air.

For extreme cases have a qualified technician remove the cooling compressor casing.

Tubing

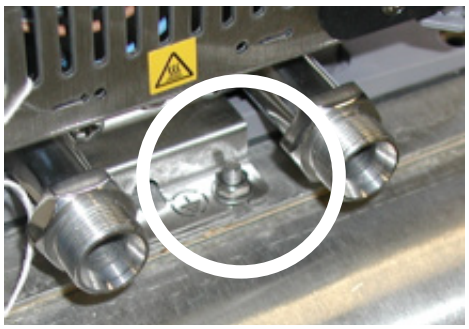
Inspect and tighten the tubing and clamps daily.

Grounding Strap and Nut

DANGER

Sahara baths require immersion circulator grounding.

If the circulator is removed for any reason you must ensure the nut and washer secures to the grounding strap located on the rear of the reservoir top when the circulator is reinstalled. ▲



Testing the Safety Features

Check the safety features for high temperature protection and low liquid level protection at regular intervals. The frequency depends on the circulator's designated application and the heat transfer fluid used.

High temperature protection
Use a flat head screwdriver to turn the arrow to the desired temperature.

Set a cut-off temperature that is lower than the desired setpoint temperature.

Switch on the circulator and ensure the circulator shuts down at the set cut-off temperature.

If the circulator does not shut down have it checked by a qualified technician.

Reset the safety to the desired temperature.

Low liquid level protection
With the circulator on, use a screwdriver and slowly push down on each level sensor, one at a time, until an error message appears. See Section 6 for details on error messages.

If not, have the circulator checked by a qualified technic

Section 6 Troubleshooting

Error Displays

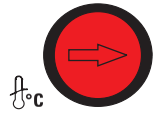
The circulator can display error messages and, if enabled, sound an alarm. Error messages are cleared by pressing the enter key ( ). Restart the circulator once the cause of the error message is identified and corrected. If the cause was not corrected the error code will reappear, contact our Sales, Service and Customer Support. If **Auto start** is enabled the circulator will restart, if disabled use the Start Up procedure.

Error Display (Typical)

Fault Displays

The heating element, pump and, if applicable, refrigeration shut down with a fault. A fault also sounds the alarm, if enabled.

Message	Cause	Actions
Bath not found	• a loss of communication between refrigerated bath and circulator	• clear message by pressing the enter key ( ) • check cable connections on the rear of the bath and circulator
High Fixed Temp.	• circulator's nonadjustable high temperature protection limit exceeded	• clear message by pressing the enter key ( ) • check fluid selection • check environmental conditions
High Temperature	• adjustable high temperature protection limit exceeded	• clear message by pressing the enter key ( ) • check limit setting • check fluid selection • ensure circulator has adequate ventilation
High Temperature Refrigeration	• high refrigeration temperature	• clear message by pressing the enter key ( ) check voltage supply • the refrigeration may need servicing, contact us
HPC High Press. Cutout	• the high refrigeration pressure cutout activated	• clear message by pressing the enter key ( ) • check for obstructions to air flow • the refrigeration may need servicing, contact us

Message	Cause	Actions
HTC-LLC	• if the fluid level is greater than approximately 57 mm (2 1/4") below the reservoir top it is a low level fault. • if not, high temperature protection limit exceeded	• clear message by pressing the enter key ( ) • if required, check for leaks and fill fluid to proper level • on smaller baths, 2 - 4 liters, if the fluid is near the minimum level reducing the pump speed may eliminate nuisance messages. • if fluid is not the issue, allow circulator to cool down to at least 10°C below the HTC setting • turn the red knob on the HTC fully clockwise • press the HTC's black reset ring • press the enter key ( ) again • reset HTC to desired setting, see Section 4 • if message reappears recycle power to circulator and repeat the procedure 
High Level	• reservoir fluid level too high for safe operation	• clear message by pressing the enter key ( ) • check fluid level, drain excess fluid if required • verify optional auto refill operation
Low Fixed Temp.	• circulator's nonadjustable low temperature protection limit exceeded	• clear message by pressing the enter key ( ) • check fluid selection
Low Temperature	• adjustable high temperature protection limit exceeded	• clear message by pressing the enter key ( ) • check limit setting • check fluid selection
Motor Fault	• high motor temperature	• clear message by pressing the enter key ( ) • it can take over 10 minutes for the motor temperature to get low enough before the circulator can be restarted
MOL **Motor Overload**	• high motor overload temperature	• clear message by pressing the enter key ( ) • allow circulator to cool down

Message	Cause	Actions
Open RTD1 Internal	• open internal temperature sensor	• clear message by pressing the enter key ( ) • contact us
Open RTD2 External	• open external temperature sensor	• clear message by pressing the enter key ( ) • contact us
Shorted RTD1 Internal	• shorted internal temperature sensor	• clear message by pressing the enter key ( ) • contact us
Shorted RTD2 External	• shorted external temperature sensor	• clear message by pressing the enter key ( ) • contact us

Warning Displays

The circulator will continue to run with a warning. A warning also sounds the alarm, if enabled.

Message	Cause	Actions
Bad Calibration	• bad temperature probe calibration	• clear message by pressing the enter key ( ) • redo calibration
High Temperature	• adjustable high temperature protection limit exceeded	• clear message by pressing the enter key ( ) • check limit setting • check fluid selection
Low Level	• reservoir fluid level too low for safe operation	• clear message by pressing the enter key ( ) • check fluid level • on smaller baths, 2 - 4 liters, if the fluid is near the minimum level reducing the pump speed may eliminate nuisance messages.
Low Temperature	• adjustable low temperature protection limit exceeded	• clear message by pressing the enter key ( ) • check limit setting • check fluid selection

Messages

Message	Actions
Bad Calibration	• redo calibration
Bath not found **Non-refrigerated?** **No** **Yes**	• for refrigerated baths, check all communication connections • **Note** before connecting ensure the power is off. ▲ • for non-refrigerated baths, select Yes
Calibration Saved	• press enter ( )
Calibration Restored	• press enter ( )
RS232 Enabled	• press enter ( )
RS485 Enabled	• press enter ( )
Remote Start Enabled	• press enter( )

Checklist

Circulator will not start

Check the display for error codes, see Error Codes in this section.

Ensure the circuit protector(s) is in the on (I) position.

Make sure supply voltage is connected and matches the circulator's nameplate rating ±10%.

No display

Recycle the circuit protector on the rear of the circulator.

Display reads 239°C

External temperature probe selected but no probe attached to circulator.

Attach external probe or select internal temperature sensor.

Circulator will not circulate process fluid

Check the reservoir level. Fill, if necessary.

Check the application for restrictions in the cooling lines.

The pump motor overloaded. The pump's internal overtemperature overcurrent device will shut off the pump causing the flow to stop. This can be caused by low fluid, debris in system, operating circulator in a high ambient temperature condition or excessively confined space. Allow time for the motor to cool down.

Ensure supply voltage matches the circulator's nameplate rating ±10%.

Inadequate temperature control

Verify the setpoint.

For refrigerated baths, ensure the condenser is free of dust and debris.

Check the fluid concentration.

Ensure circulator installation complies with the site requirements in Section 3.

Ensure supply voltage matches the nameplate rating ±10%.

If the temperature continues to rise, ensure your application's heat load does not exceed the rated specifications.

Enter the controller menu and ensure the ENERGY SAVER mode is on in order for the system to maintain a stable temperature.

Check for high thermal gradients (e.g., the application load is being turned on and off or rapidly changing).

Circulator shuts down

Ensure button wasn't accidently pressed.

Ensure the circuit protector(s) is in the on (I) position.

Check the display for error codes.

Make sure supply voltage is connected and matches the nameplate rating ±10%.

Restart the circulator.

USB Driver Not Recognized

If your operating system does not automatically recognize the optional driver log on to:

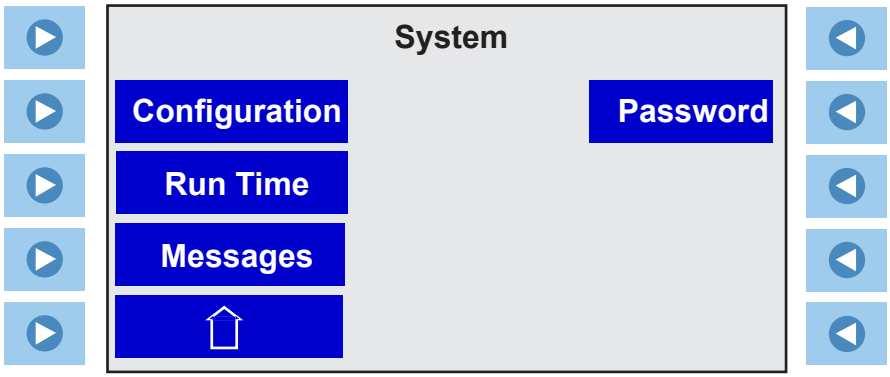
http://www.ftdichip.com/FTDrivers.htm

for instructions.

Please contact Thermo Fisher Scientific Sales Service and Customer Support if you need any additional information, see inside cover for contact instructions.

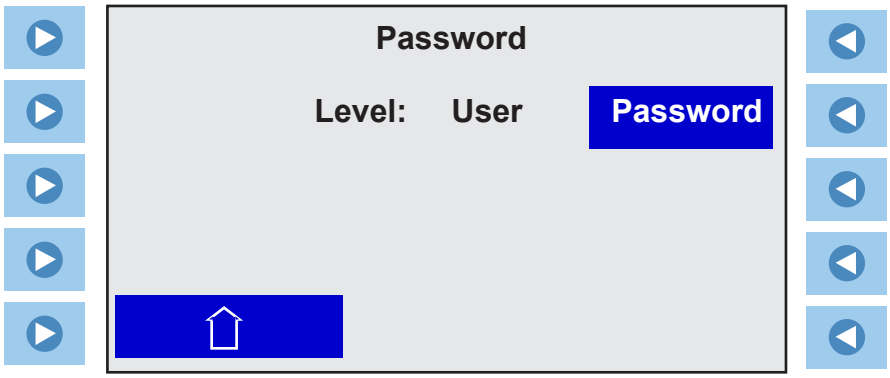
Section 7 Password

Password is used to perform a calibration or to change the circulator's PID values. It is also used to reset the circulator to factory preset values. To do this change the circulator's level from the **User** mode to the **Operator** mode.

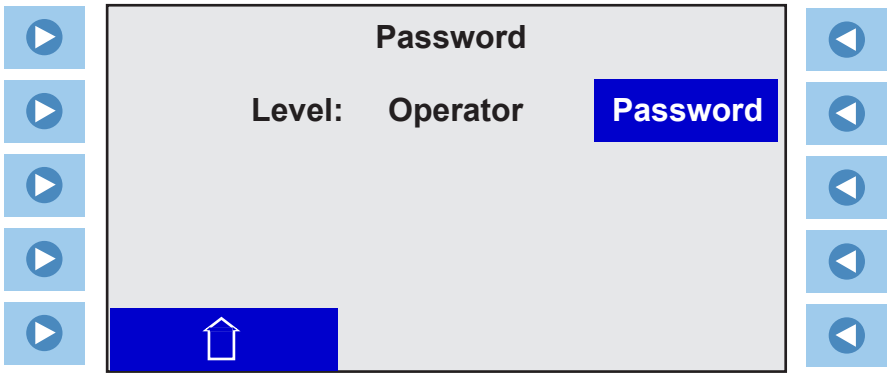


Operator Mode

• Press next to **Password** to display:

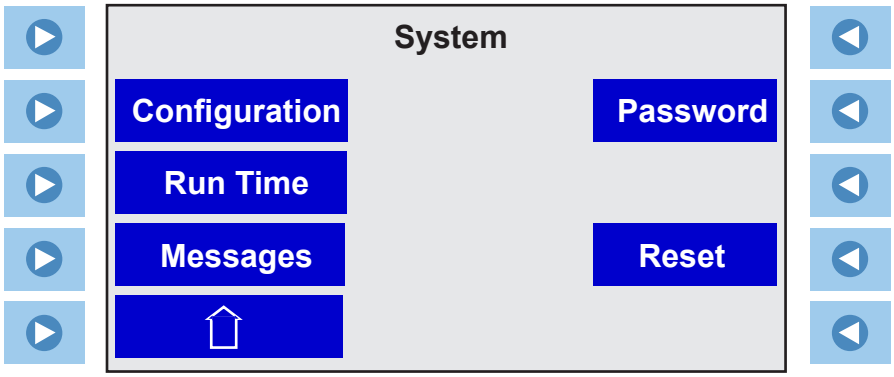


• Press next to **Password** to display the Change a Value Display. Change the **Password** to **1** and press to display:



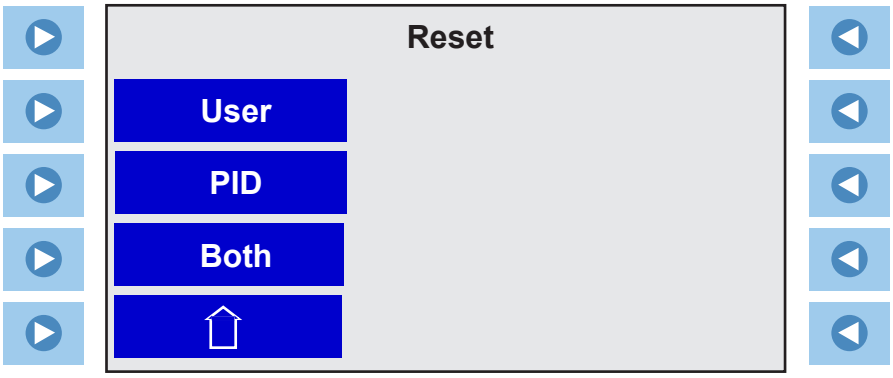
• The circulator is now in the **Operator** mode.

• Press esc to display:



Reset

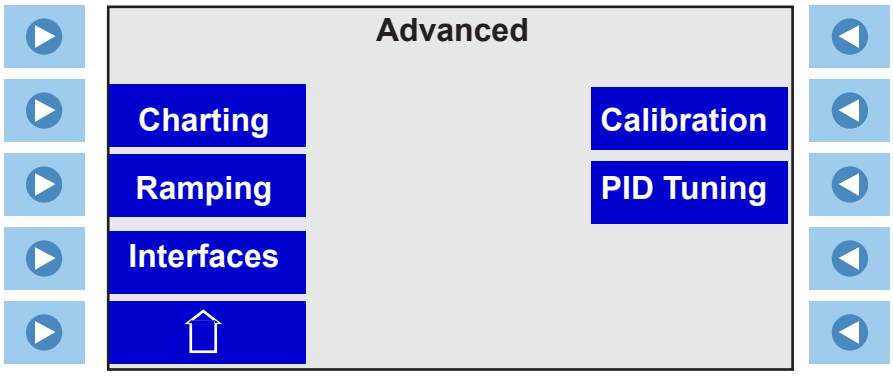
• If desired, press next to **Reset** to display:



• Press on the left of **User** adjustable settings, **PID** values or **Both** to reset factory values. **Note** The reset takes several seconds. ▲

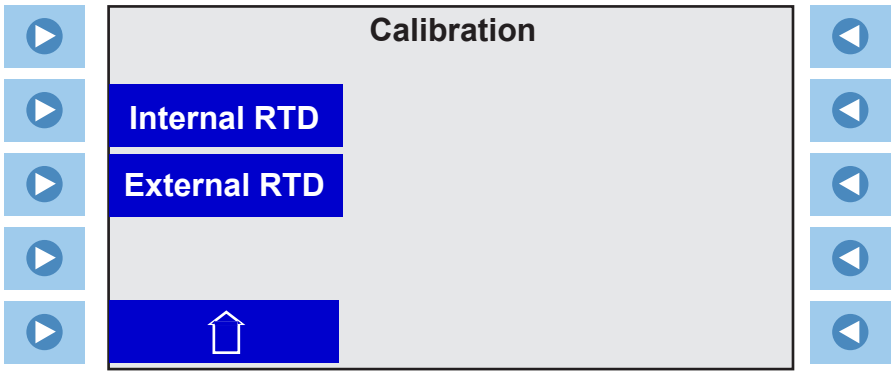
Calibration

• Return to the Advanced menu screen to display:



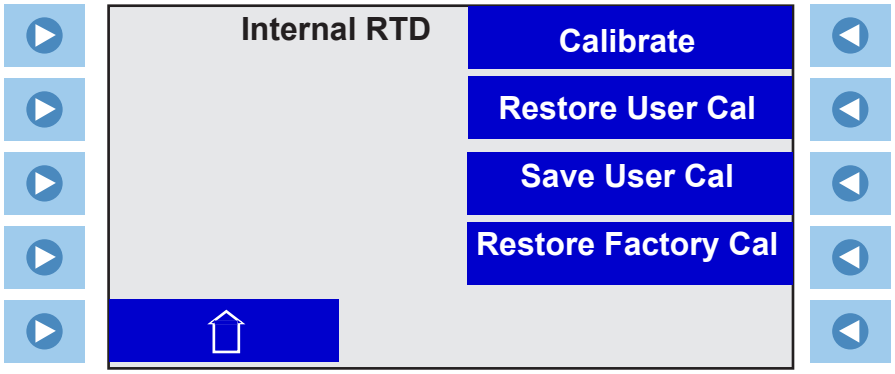
Note Ensure RTAs are set to zero before performing a calibration. ▲

• To perform a calibration, press on the right of **Calibration** to display:

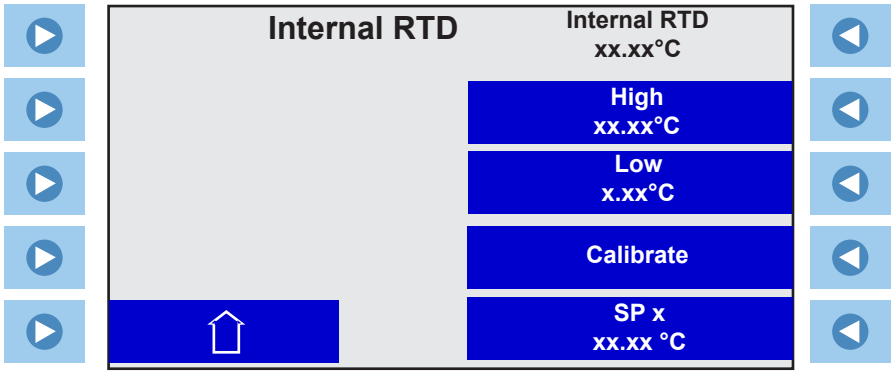


• Press on the left of the desired temperature sensor to display:

Note For ease of calibration, ensure the sensor selected is the sensor controlling the temperature. Do not calibrate the internal probe if the external probe is controlling temperature. ▲



• Press on the right of **Calibrate** to display:



• Press on the right of **SPx** to display the Change of Value Display. Enter the desired high of low calibration temperature. Press .

• Using the temperature display at the top right of the display, allow the temperature to stabilize for several minutes near the calibration temperature.

Internal RTD
xx.xx°C

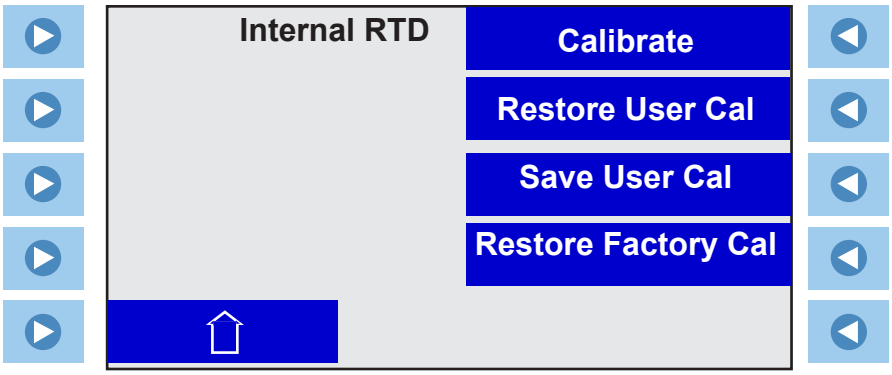
• Once stabilized, press on the right of either **High** or **Low**.

• Press on the right of **SPx** to again display the Change of Value Display. Enter the other calibration temperature and repeat the procedure.

• Once both points are entered, press on the right of **Calibrate** to complete the procedure. The calibration is stored in the circulator's non-volatile memory.

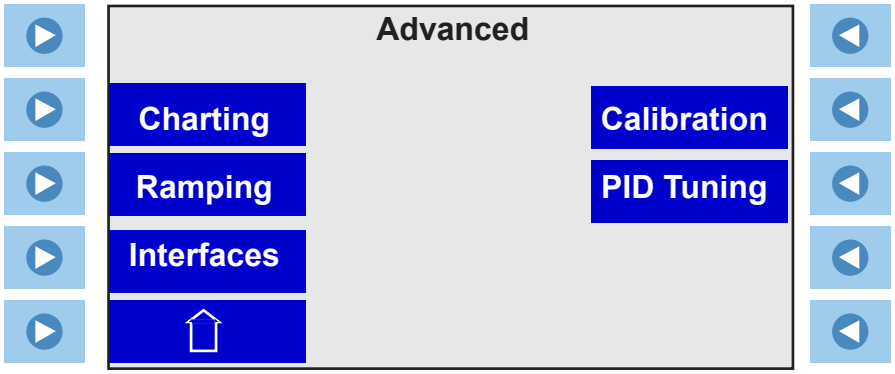
As a backup, once the calibration is completed you can store it into the circulator's memory by selecting **Save User Cal**. You can later restore that calibration by pressing **Restore User Cal**.

Another option is to restore the factory calibration values by pressing **Restore Factory Cal**.

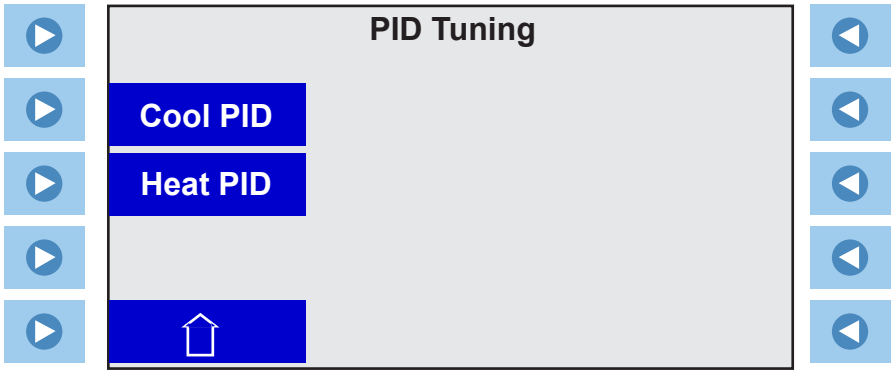


PID Tuning

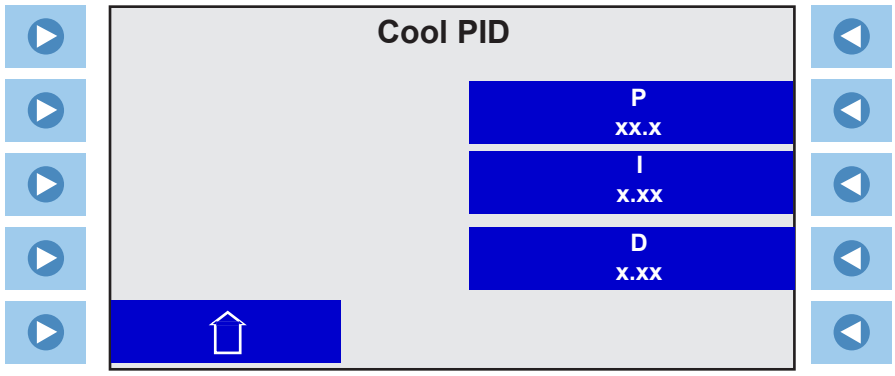
• To change the circulator's PID values press to the right of **PID Tuning**.



• The circulator display:



• Press to the left of either **Cool PID** or **Heat PID** to display:



• Press on the right of the desired value to display the Change of Value Display.

User Mode

The circulator resets to the **User** mode by:

- changing the **Password** back to **0**.
- turning the circulator off

Note The circulator also reverts to the **User** mode whenever either the Start or Status Display is displayed continuously for 10 minutes. ▲

Appendix AC Serial Communications Protocol

Serial communication is accomplished either through the optional 9-pin Serial Communications Box or through the USB port on the immersion circulator. If your operating system does not automatically recognize the optional driver log on to: http://www.ftdichip.com/FTDrivers.htm for instructions.

Note This appendix assumes you have a basic understanding of communications protocols. Information on the NC, STANDARD and NAMUR protocols is available upon request.

Note Keypad operation is still available with serial communications enabled.

Note NC protocol is required to use RS485 device addressing.

All commands must be entered in the exact format shown in the tables on the following pages. The tables show all commands available, their format and responses. Controller responses are either the requested data or an error message. The controller response must be received before the host sends the next command.

The host sends a command embedded in a single communications packet, then waits for the controller's response. If the command is not understood, the controller responds with an error command. Otherwise, the controller responds with the requested data.

Commands are not case sensitive. Upper or lower case letters may be used. Commands are listed in the Commands Table, error responses are given in the Errors Table, and symbols are shown in the Key Table.

Key	
Symbol	Meaning
[B]	A binary value 0 or 1 (0 = Off, FALSE or Disable(d); 1 = On, TRUE or Enable(d)).
[CR]	Carriage return – used as the termination character.
[U]	Text representing the units associated with a value.
[V]	A value that can be requested in a read command or sent as part of a set command.
[V_{MAX}]	Maximum allowed value. Part of error message when set value is too high.
[V_{MIN}]	Minimum allowed value. Part of error message when set value is too low.

Value: Read commands return analog [V] or bit [B] values or settings, while set commands send analog or bit settings. Read commands return values in the same displayed precision. Set command messages missing the space character between the command and the setting will be rejected, as the user's intent is unclear.

Units: A read command returning an analog [V] value or setting, will include the units [U] associated with that value or setting. A set command sending an analog value will not include the units. The units returned by the complementary read command are assumed.

Termination character: A carriage return [CR] is used to terminate command and response messages. (Typically the "Enter" key on the keyboard.)

Note The inter-character timeout (time between transmitted characters) is set to30 seconds. Exceeding the timeout will clear the receiver buffer and require the message to re retransmitted.

Note Special characters (backspace, delete, insert, etc.) are not recognized and generate error responses.

Commands Table			
Commands All messages from master and slave are terminated with a carriage return [CR]			
Command Description	Master Sends	Sample Slave Response (echo off)	Alternate units
Read Temperature Internal	RT	[V]C	F K
Read Temperature 2 External (optional)	RT2	[V]C	F K
Read Displayed Setpoint	RS	[V]C	F K
Read Internal RTA1 – Internal RTA5	RIRTA1 – 5	[V]C	F K
Read External RTA1 – External RTA5	RERTA1 - 5	[V]C	F K
Read Setpoint X (X = 1 to 5)	RSX	[V]C	F K
Read High Temperature Fault	RHTF	[V]C	F K
Read High Temperature Warn	RHTW	[V]C	F K
Read Low Temperature Fault	RLTF	[V]C	F K
Read Low Temperature Warn	RLTW	[V]C	F K
Read Proportional Heat Band Setting	RPH	[V]%	
Read Proportional Cool Band Setting	RPC	[V]%	
Read Integral Heat Band Setting	RIH	[V]Repeats per minute	
Read Integral Cool Band Setting	RIC	[V]Repeats per minute	
Read Derivative Heat Band Setting	RDH	[V]Minutes	
Read Derivative Cool Band Setting	RDC	[V]Minutes	
Read Temperature Precision	RTP	[V]	
Read Temperature Units	RTU	[V] C,F,K	
Read Unit On	RO	[B]	
Read External Probe Enabled (optional)	RE	[B]	
Read Auto Restart Enabled	RAR	[B]	
Read Energy Saving Mode	REN	[B]	
Read Time	RCK	hh:mm:ss	
Read Date	RDT	mm/dd/yyyy or dd/mm/yyyy	
Read Date Format	RDF	mm/dd/yyyy or dd/mm/yyyy	
Read Ramp Status (optional)	RRS	Stopped, Running, Paused	
Read Firmware Version	RVER	[V]	
Read Firmware Checksum	RSUM	[V]	
Read Unit Fault Status	RUFS	[V1, V2 , V3, V4, V5] See page A-5	
Read Ramp Program (optional)	RRP	[V1, V2 , V3, V4, V5] See SRP on page A-4	

Commands All messages from master and slave are terminated with a carriage return [CR]		
Command Description	Master Sends	Sample Slave Response
Set Displayed Setpoint	SS [V]	OK
Set Internal RTA1 – Internal RTA5	SIRTA1 – SIRTA5 [V]	OK
Set External RTA1 – External RTA5	SERTA1 – SERTA5 [V]	OK
Set Setpoint X (X = 1 to 5)	SSX [V]	OK
Set High Temperature Fault	SHTF [V]	OK
Set High Temperature Warning	SHTW [V]	OK
Set Low Temperature Fault	SLTF [V]	OK
Set Low Temperature Warning	SLTW [V]	OK
Set Proportional Heat Band Setting	SPH [V]	OK
Set Proportional Cool Band Setting	SPC [V]	OK
Set Integral Heat Band Setting	SIH [V]	OK
Set Integral Cool Band Setting	SIC [V]	OK
Set Derivative Heat Band Setting	SDH [V]	OK
Set Derivative Cool Band Setting	SDC [V]	OK
Set Temperature Resolution	STR [V]	OK
Set Temperature Units	STU [V] C,F,K	OK
Set Unit On Status	SO [B]	OK
Set External Probe On Status (optional)	SE [B]	OK
Set Auto Restart Enabled	SAR [B]	OK
Set Energy Saving Mode	SEN [V]	OK
Set Pump Speed	SPS [V] 40 to 100	OK
Set Ramp Number (optional)	SRN [V]	OK

Commands All messages from master and slave are terminated with a carriage return [CR]		
Command Description	Master Sends	Sample Slave Response
Set Ramp Program this will load defaults for all steps declared by V1	SRP [v1,v2,v3,v4,v5] V1 #of steps V2 variance V3 cycles V4 start temp V5 end state S=stop M=maintain	OK Note: If unit allows more than one ramp the ramp number must first be set.
Set Ramp Step	SRS[v1,v2,v3, v4] V1 step # V2 end temp V3 duration V4 assured soak	OK Note: If unit allows more than one ramp the ramp number must first be set and SRP defined. (0,1)
Set Ramp On Status	SRO [V] S,E,P Start, End, Pause/resume	OK Note: (P) pause toggles Pause/resume

Error Table	
Errors	
Error Description	Slave Responds
Not defined, not implemented or incorrectly formatted	? Unsupported command
Extra characters…	? Format error
Set value too high	? Maximum allowed is [V_{MAX}]
Set value too low	? Minimum allowed is [V_{MIN}]
Argument to binary set command not 0 or 1	? Value must be 0 or 1
Set command attempted while in read only mode	? Mode is read only
Set command failed (e.g. SO 1 with low level)	? Failed

RUFS Read Unit Fault Status

This command returns 5 values. These are decimal representations of hexadecimal values. Each individual bit of the value represents a different warning, fault or status.

decimal	hex	B7	B6	B5	B4	B3	B2	B1	B0
1	1	0	0	0	0	0	0	0	1
2	2	0	0	0	0	0	0	1	0
4	4	0	0	0	0	0	1	0	0
8	8	0	0	0	0	1	0	0	0
16	10	0	0	0	1	0	0	0	0
32	20	0	0	1	0	0	0	0	0
64	40	0	1	0	0	0	0	0	0
128	80	1	0	0	0	0	0	0	0

<table>
<tr><th>Value</th><th>Description of bits</th><th>Value</th><th>Description of bits</th></tr>
<tr><td>V1</td><td>B0 – B5 unused
B6 rtd1 shorted
B7 rtd1 open</td><td>V2</td><td>B0 HTC fault
B1 high RA temperature fault
B2 – B7 unused</td></tr>
<tr><td>V3</td><td>B0 low level warn
B1 low temperature warn
B2 high temperature warn
B3 low level fault
B4 low temperature fault
B5 high temperature fault
B6 low temperature fixed fault
B7 high temperature fixed fault</td><td>V4</td><td>B0 PWM heat duty cycle > 0
B1 compressor on/off
B2 pump on status
B3 circulator on status
B4 circulator stopping
B5 circulator fault status
B6 unused
B7 beeper on status</td></tr>
<tr><td>V5</td><td colspan="3">B0 pump speed fault
B1 MOL fault
B2 HPC fault
B3 cool icon on steady (circulator is cooling at max capacity)
B4 cool icon flashing (circulator is cooling)
B5 heat icon on steady
B6 heat Icon flashing
B7 external sensor controlling</td></tr>
</table>

Refer to Key table on page 1 for explanation of symbols and their meanings.

Examples:

Read Temperature:

Host

R	T		**CR**
Command			[CR]

Controller:

2	0	.	0	C	**CR**
[V]				[U]	[CR]

Set Setpoint:

Host

S	S		2	0	**CR**
Command			[V]		[CR]

Controller:

O	K	**CR**
Command Accepted		[CR]

Read Temperature 2:

Host:	R	T	2	**CR**		
Controller:	2	0	.	0	C	[CR]

Set Setpoint to -22°C when minimum allowed is -20°C: Minimum allowed is *[V_{MIN}]*

Host:	S	S		-	2	2	**CR**																	
Controller:	?		M	i	n	i	m	u	m		a	l	l	o	w	e	d		i	s		-	2	0	**CR**

Laboratory Equipment Div.
25 Nimble Hill Road
Newington, NH 03801

DECLARATION OF CONFORMITY

CE

Manufacturer: Thermo Fisher Scientific

Address: 25 Nimble Hill Road
Newington, NH 03801 USA

Date of inception 2009

We declare that the following products conform to the Directives and Standards listed below.

Products: ThermoTemp Refrigerated and non refrigerated heated liquid baths
All rated 100Vac-50HZ & 60Hz or 115Vac-60Hz or 230Vac-50Hz.

Refrigerated and non refrigerated heated liquid baths:

Models: SC100, SC150, SC150L, AC150 or AC200 control head assembled with an A5B, A10B, A25B, A10, A25, A28, A28F, A40, G50, S3, S7, S13, S15, S21, S30, S45, S49, S5P, S14P S21P, S6T, S12T or S19T.

Control heads, intended as a component for use only in the ThermoTemp product line of refrigerated and non refrigerated liquid baths.

Models: SC100, SC150, SC150L, AC150, AC200, PC200 & PC300.

Bath assemblies intended as a component for use only with ThermoTemp control heads.

Models: A5B, A25, A10B, A24B, A25, A25B, A28 & A40.

Immersion circulators:

Models: SC100, SC150, SC150L, AC150, AC200, PC200, PC201 & PC300.

ThermoTemp bath accessories, not mains connected:

BOM #s: 1600027, 1600075 & 1600076.

Equipment Class: Measurement, control and laboratory

Directives and Standards:

2004/108/EC – Electromagnetic Compatibility (EMCD):

EN 61326-1: 2006 – Electrical equipment for measurement, control, and laboratory use – EMC Requirements - EMC Class A.

2006/95/EC – Low Voltage Directive (LVD):

EN 61010-1: 2010 – Safety requirements for electrical equipment for measurement, control, and laboratory use: general requirements.

En 61010-1: 2001 – Safety requirements for electrical equipment for measurement, control, and laboratory use: General requirements.

En 61010-2-010: 2003 – Safety requirements for electrical equipment for measurement, control, and laboratory use – part 2-010: Particular requirements for laboratory equipment for the heating of materials.

2011/65/EU - Restriction of the Use of Certain Hazardous Substances In Electrical and Electronic Equipment (ROHSD).

EN 50581: 2012 - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

2012/19/EU - Waste from Electrical and Electronic Equipment (WEEED).

Manufacturer's Authorized Representative: Date:

Robin Wiley

14 July 2014

Robin Wiley Compliance Engineering

Laboratory Equipment Div.
25 Nimble Hill Road
Newington, NH 03801

RoHS DECLARATION OF CONFORMITY

Manufacturer: Thermo Fisher Scientific

Address: 25 Nimble Hill Road
Newington, NH 03801 USA

Products: Standard ThermoTemp refrigerated and non refrigerated heated liquid baths and their associated standard accessories.

Thermo Fisher Scientific certifies that the above ThermoTemp models meet the requirements of DIRECTIVE 2002/95/EC, Restriction of Hazardous Substances Directive (RoHS). Thermo Fisher Scientific certifies that these ThermoTemp models contains less than the following amounts of the six RoHS banned substances with the exemption stated in Note 2 below:

Substance		Threshold Level
Lead…	Pb	Less than 0.1% [1 & 2]
Mercury…	Hg	Less than 0.1% [1]
Hexavalent Chromium …	Cr (VI)	Less than 0.1% [1]
Polybrominated Biphenyls …	PBB	Less than 0.1% [1]
Polybrominated Diphenyl Ethers …	PBDE	Less than 0.1% [1]
Cadmium …	Cd	Less than 0.01% [1]

Notes:

1. Tolerated maximum concentration value by weight in homogeneous materials.
2. Exemptions - Lead as an alloying element in steel containing up to 0.35% lead by weight, aluminum containing up to 0.4% lead by weight and as a copper alloy containing up to 4% lead by weight.

Manufacturer's Authorized Representative: Date:

Robin Wiley

20 Sept. 2013

Robin Wiley Compliance Engineering

Warranty

For the special sales promotional period between May 1, 2015 and September 30, 2015 the warranty period and conditions below are extended to 48 months from date of shipment for the ARCTIC, GLACIER and SAHARA Bath circulators only. This promotion does not cover standalone Immersion Circulators.

Otherwise, Thermo Fisher Scientific warrants electronic components for 36 months from date of shipment the Thermo Scientific PREMIUM series of Immersion Circulators, ARCTIC and GLACIER refrigerated/heated bath circulators, and SAHARA heated bath circulators according to the following terms.

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The buyer shall be responsible for any evaluation or warranty service call (including labor charges) if no defects are found with the Thermo Scientific product.

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In addition, this warranty does not extend to repairs made by the use of parts, accessories, or fluids which are either incompatible with the product or adversely affect its operation, performance, or durability.

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